

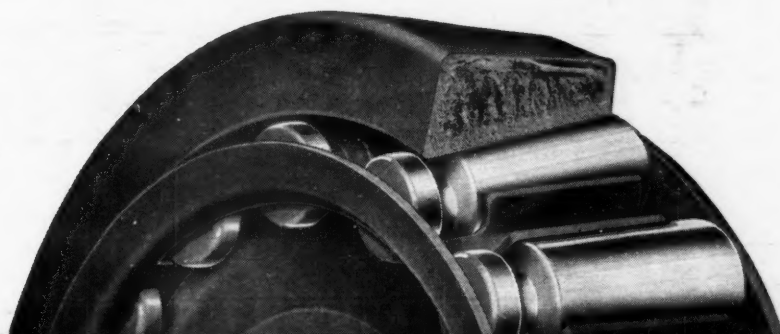
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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تیمکن تایپرڈ رولر بیریج
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فنس اینڈیاہ آمریکا و آو
یا ایسی اوٹوموبلار و قریطکہ
و عتلاقہ رولر سیکم عملہ
نن ایجمن قوللاووب ان
ہیولا دایا تیلیس و قووت
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and tractors, not
only in the United
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rope, is marked by
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Tapered Roller
Bearings, consist-
ently to conserve
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NEW YORK—THURSDAY, SEPTEMBER 22, 1921

No. 12

Service Dominant Idea at M. A. M. A. Credit Meeting

Service to the motor vehicle user is an obligation of both parts and car manufacturers, speakers say. Spirit of cooperation appears in credit discussions. Better selling methods considered a necessity.

By James C. Dalton

WHILE there was unanimous agreement that business has turned the corner and that prosperity is on the way, that was not the big, vital dominating thought to be gained by the automotive industry from the fifth annual credit convention of the Motor and Accessory Manufacturers' Association, held at Detroit Sept. 14, 15 and 16.

The fundamental, brass-tacks message of every speaker was that the time has come when the interests of the ultimate consumer must be taken into account before everything else. Each one hammered home with iteration and reiteration the plea, which amounted to a demand for real service to the buyers of motor vehicles.

Every convention has a keynote and this meeting had one which sounded so loud it might have been mistaken for a brass band. That message was SERVICE in the blackest and biggest of capital letters. When the parts makers talked about service they meant not merely the merchandising of motor vehicles but their maintenance after they are sold. In fact maintenance seemed to be considered fully as important as the initial sale, for the replacement market looms large in their calculations.

The plea for service for the purchaser ran all the way from the raw material producer to the man who operates the cross roads service station and sells gaso-

line or adjusts carbureters. There was recognition of the need for making dealers in automotive merchandise real merchants who know how to sell as well as the butcher, the baker, the grocer, et al.

The parts and accessory manufacturers confessed their own obligation in this respect, but insisted that every branch of the industry has at least an equal obligation. They considered the problem from every angle.

Unanimity on the need of service was the more remarkable because that subject had no definite place on the program. When every speaker took it by the nape of the neck and dragged its shrinking form into the light to be put upon the rack there was no escaping the thought that was uppermost in every mind.

Service was by no means the only subject considered and there was much in what was said for the manufacturers of motor vehicles to ponder over. The convention, the most successful the association ever held, naturally was designed for consideration of the problems peculiar to the parts maker, but it was apparent that the 250 members present, representing the leading companies in the parts field, had agreed that the industry as a whole has common obligations and common interests.

Increased sales of motor vehicles are just as much to the interest of the maker of axles and piston rings

as it is to the manufacturer of cars and trucks or the man who sells them. A spirit of co-operation shone through the entire convention, both on the floor and in the hotel lobbies. There was evident an earnest desire to be mutually helpful.

One incident will suffice as an illustration. There was scheduled an open discussion of business conditions within the industry from the credit standpoint. L. L. Smith, assistant treasurer of the B. F. Goodrich Rubber Co., was the leader. He contended that the members of the M. A. M. A. had been unduly merciful and that it was high time drastic action was taken, even through legal proceedings, against companies which have had accounts past due for 12 or 15 months without reducing them a dollar.

The slogan last year, he said, was "no bankruptcies," but these manufacturers have had their chance and haven't worked out of the hole. Many of the ones in this class were virtually insolvent before the war but were saved by the insatiable demand for their products while hostilities were in progress. Now they have reverted to their pre-war status. They are resorting to every means, stock-selling and otherwise, to hang on. He held that it was time to protect the public from these stock jobbing schemes. Manufacturers in good standing have the field pretty well covered and there is no hope for the others, Smith said.

"We're through taking gold notes and gold bonds and promissory notes," he declared.

It might have been expected this ultimatum would have been received with three rousing cheers, but it wasn't. On the contrary there was a storm of opposition. It was asserted that a live company, even though it may be moribund, is much better than a dead one. It was contended precipitate action of this character against the companies which may deserve little sympathy, might lower the morale of the entire industry and force to the wall others which are striving manfully to get out of their present troubles with every prospect of success. Those which are without bank support might involve others which have.

Instances were cited of companies which had been tangled up in bowknots of financial difficulties but had been straightened out through the co-operation and consideration of creditors. The majority plainly were determined to go on "holding the bag" until the time is more opportune for "rocking the boat."

While the plea for charity prevailed it brought with it some plain speaking. Inefficient management was held responsible for the troubles of most of the vehicle companies now in difficulties. This inefficiency ran all the way from general managers who had been good salesmen but didn't know a balance sheet from a roll of wall paper, down to retail sales organizations which failed to function because of the stupidity of some of the men in them. It was held that if executive and managerial ability was hoisted a few notches it would be generally helpful.

The moral hazard in the business was not overlooked and it is likely to play an increasingly important part in the granting of credit. More than one speaker asserted that the industry should purge itself of "fly-by-night" enterprises which prey upon the public by putting on the market a few vehicles which soon become orphans, or which sell worthless securities. It was dryly remarked, however, that the public sometimes resents being protected and that it seems determined to have its pretty gilt bricks.

Fully as striking as the desire to co-operate in saving concerns with potentialities for success, and many of

them have been saved by forbearance, was the proposal made by more than one that parts makers might profitably spend their own money to expand the sale of motor vehicles.

William H. Huff, advertising manager of the Distel Wheel Corp., Detroit, proposed that a co-operative advertising campaign along this line be conducted through the M. A. M. A. Men should be taught how to sell, he said, and there is a pathetically large number in the automotive industry ignorant of the products they are merchandising. He told of live prospects within his own acquaintance who never had been invited to buy a car or even accessories for the ones they now own. It was his opinion that the M. A. M. A. could well afford to hire a big man to plan selling campaigns. Better motor cars and trucks are a necessity, he said, as well as better distributors and dealers.

Arthur T. Garrett, editor of the house organ of the Timken-Detroit Axle Co., who represented Frank N. Sim, advertising and assistant sales manager, told of the advertising his company is doing to boost sales of motor vehicles without any reference to its own products.

Huff and Garrett spoke in a symposium on "Selling Strategy to Bring the Automotive Industry Back to Normal." The ideas brought out in these talks applied to all branches of the industry and included some of the strongest sermons on service. Notable in this respect was the address of F. S. Armstrong, sales manager of the Vesta Battery Co., Chicago.

Armstrong began by declaring that times could not be "considered normal when hectic buyers were clamoring to buy ash cans on wheels, backed by Gyp the Blood for \$1385 f.o.b. Detroit."

"Automobile manufacturers must realize," he said, "that the buying public is using uncanny discrimination in getting real values. Car selling is not the only strategy. The chief thing to be improved and the one that will help most of all is improved service. It must be service that means something, not merely mechanical service, but the morality of service. This kind of service will improve business. Many a car owner skins his knuckles tinkering at some job for which he would gladly pay a service man what it was worth, but not five or ten times what it is worth. The Gyp the Blood must go. I proudly profess a religion of service. He profits most who serves best. The automotive industry must get together to raise the standards of service. We have only one customer and that is the ultimate consumer."

Most eloquent of Armstrong's words was his statement that August was the biggest month the Vesta Battery Co. ever had.

Joseph Jacobs, advertising manager of the American Hammered Piston Ring Co., Baltimore, advised every company to analyze its own problems and get down to business, chiefly by strengthening its sales organization and teaching its men how to sell and how to give service. He said that because of this system his own company had done as much business in the eight months ending Aug. 31 as it did all of last year and that it expected the year to show an increase of 100 per cent.

Another gospel in addition to that of service was preached. It was the essentiality of the motor vehicle as an agent of transportation. B. F. Rutherford, vice-president of the B. F. Goodrich Rubber Co., and of the M. A. M. A., declared every man in the industry should make this a creed like the Lord's prayer or the national anthem. In estimating what was normal, Rutherford said a good definition was:

"Normal in 1913 plus the progress which has been made since then."

In connection with sales strategy he declared there

never was a time like the present to stick to fundamentals, but that this did not mean to cling like grim death to obsolete methods. Reduce stocks and inventories, he said. Put individuals to the test. It is all a question of economics. Here are some of the things he suggested:

Establish a price level, study your markets, cut selling costs, cut your past due lists, have salesmen make collections, strengthen the allegiance of your customers, recognize that you are in competition, study the best ways of doing business.

In a discussion of the credit situation, C. S. Davis, secretary and treasurer of the Warner Gear Co., Muncie, Ind., gave some advice which might be applied by every man with goods to sell. As a preliminary, he said the interests of the car builders were the interests of the parts makers. He advised that information upon which credit was granted should include the following points:

Financial condition and current statement.

Reserve financial resources.

Sales position viewed broadly, including character and capacity of sales organization.

Personality of active officers.

Managerial and organization policies.

Resentment of any imputation that the motor car is not an essential ran through the whole thread of the convention. It was emphasized by Harry G. Moock, general manager of the National Automobile Dealers Association, in his address on "Business Conditions in the Automotive Industry and the Prospects for the Future," from the standpoint of the dealer. It might be stated parenthetically that Moock made one of the hits of the convention. It was evident the parts makers were eager to hear of the dealers' problems and sympathized with them.

Moock sketched the financial troubles which began for the dealers when the governors of certain Federal Reserve Banks gave out the dictum that motor cars were luxuries and that automobile paper would not be rediscounted. He recounted the fight of the N. A. D. A. to have the stigma removed but declared that while the battle had been successful so far as official action went the prejudice still prevailed in many banks, especially in the rural districts.

"Many dealers are honest, statements to the contrary notwithstanding," said Moock. "The dealer is the buffer between the manufacturer and the ultimate consumer. I admire him for the way he has met his problems. He has kept the factories running in spite of every obstacle. The dealers who are real merchants are doing business and selling cars."

"The average business life of the automobile retailer is 3½ years. The average of all retailers is 7½ years. Something must be done besides making cars and shipping them out with bill of lading attached. The dealer

must be shown how to do business. The flux in the industry is a great economic loss. Factory sales managers often don't know what to do. A tremendous educational program is needed to bring automobile merchants up to the grade of other merchants. It has been demonstrated that membership in an association extends a dealer's longevity. The man who has the courage of his conviction that he is selling transportation can dig prospects out of all kinds of odd corners. There is no buyers' strike. Everybody wants cars. It is mostly a question of finance. Everyone who owns an open car wants a closed car. That alone provides endless prospects."

Referring to the subject of legislation and unfair taxes on automobiles Moock said:

"Just so long as business men continue to elect politicians to office just so long will we have politics in business."

He said the automotive industry was singled out for attack because it was least organized.

Moock asserted that the used car problem is one for the entire industry to solve because 90 per cent of the sales made involved trade-ins. In many cases the man buying a car is a better business man than the one who sells.

He, too, stressed the importance of service and he invited the parts makers to cooperate in conducting a course of shop lectures for mechanics.

Many of the speakers brought out the point that it is the retail sale which is vital to the industry. Charles Burr, treasurer of S. K. F. Industries, New York, declared that if the merchandising of automobiles had been on a scientific basis much of the industry's troubles could have been avoided.

"We must address ourselves," he said, "to the question of how to strengthen

this weak spot in the automotive industry."

Utility, price, comfort, safety and low upkeep costs in the order of their importance were given by J. M. McComb, vice-president of the Crucible Steel Co., as the prime essentials for a motor car. He predicted that lower costs would stimulate buying. This idea was echoed by others. It was agreed there must be immediate deflation of prices all along the line.

There wasn't a note of pessimism in the whole convention. It was agreed that the worst is over, that the tide has turned and that prosperity is coming back. No one expects a boom and no one wants one. No one has any illusions. As H. H. Rice, president of the Cadillac Motor Car Co., expressed it, "We can expect a fairly decent business from now on."

Business is better now than it was expected to be a month ago, members of the association admitted, and it has been better for the last three months than it was expected to be. None of the parts and accessory makers have exaggerated expectations for the remainder of this year, but the accumulation of orders on their books is being gradually whittled down and they are getting some

HERE are some of the striking statements made at the convention:

"The weakest link in the chain of automotive finance is that between the manufacturer and the dealer."—Charles Burr, treasurer S. K. F. Industries.

"A passenger chassis cannot be made to do double duty in the field of freight transportation."—Ezra W. Clark, advertising manager Clark Equipment Co., Buchanan, Michigan.

"It must be admitted that standardization has placed the American car in the pre-eminent position it occupies in the world."—G. Brewer Griffin, manager automotive equipment department, Westinghouse Electric & Mfg. Co.

"We must stop comparing business and profits with 1918 and 1919 and compare them with 1913, for 1913 was last year for us."—J. P. Harris, vice-president Union Trust Co., Cleveland.

"Credit dealt industry a severe blow but only through credit will the results be warded off."—C. W. Dickerson, vice-president Timken-Detroit Axle Co.

"There should be not merely a mechanical service but a morality of service. Gyp the Blood has got to go."—F. S. Armstrong, sales manager, Vesta Battery Corp.

new business. They expect the sale of automobiles to go along for the next three months pretty much as it has for the past four.

The optimism which radiated from the meeting wasn't based merely on hope, it was founded on fact. Fundamental business conditions are better not only in the United States but throughout the world. Improvement will be gradual and there will be ups and downs, but there will be no great slump. The industry has been through a terrific storm and has come through it sound as a rock, although more or less battered.

It was admitted that the mortality attendant upon the storm, as represented by failures, had been surprisingly small. It is true that the safes of the parts makers are well filled with gold notes and bonds, promissory notes, trade acceptances and all kinds of I. O. U.s., but they are not in any sense discouraged.

J. P. Harris, vice-president of the Union Trust Co., Cleveland, who spoke on business conditions from the standpoint of the banker, radiated good cheer. He said he was a firm optimist from all standpoints.

"Some of you may think business is rotten," he said, "but you are so close to it you see the specks on the window. There never was more ground for optimism. The banks will not be stingy with legitimate enterprises, but there will be no loans to manufacturers or merchants who are trying to maintain war prices and refuse to take their losses. The crux of the situation is that you have got to stop comparing with 1918 and 1919. We must compare with 1913. That was last year for us.

"The worst is over. There is evidence that the supply of credit to grease business has passed normal. The end of the bear market is at hand. Security markets are predicting a revival of business. We may be certain that by late winter or early spring we will be looking at the sunshine with the clouds behind us. By another summer we will be getting back to increased business.

"All labor must be liquidated to equal the liquidation on the farms. All prices must be equalized with farm levels. The automotive industry will find the next year or two an era of tremendous competition and falling prices. Manufacturers must meet the price cuts of competitors. The parts makers must help. It will be a survival of the fittest. You must meet the competition of superior service. You must get rid of high-priced inventories and get labor down. The army of unemployed will take care of the wage question and bring wages lower.

"You must buy carefully and a shorter period must elapse between production and sale. There must be a rapid turnover for the next 8 or 10 years. You must clean out your stocks and turn them into cash. Everyone must preach optimism. You must convince yourself that the worst is over and that fundamental conditions are sound."

Efficient management, economical production and fair selling to meet competition were urged by M. A. Moynihan, secretary and treasurer of the Gemmer Mfg. Co., Detroit, who agreed that the worst is over.

"As parts manufacturers," he said, "we have our own duty and responsibility to our particular industry and to the entire field of automobile production. Whether we manufacture a fan belt or a motor, that particular unit should have behind it every essential of good design, good quality, economic manufacture and honest selling. This is essential if the automobile is to be maintained as the greatest utility of transportation at a cost within the reach of the average buyer and delivering more service per dollar of cost and maintenance than any other item of family investment. As makers of the component

parts, we have a large duty in bringing about this ultimate result. And our duty compels us further, as individual manufacturers and as an association, to stamp out those practices which threaten our industry—stock-jobbing, misrepresentation, illegal combinations, over-borrowing, under capitalizing, profiteering, contract breaking and the many other faith-destroying elements which have been encountered before and which will bob up serenely again if we are not on the job to promote and protect the name and character of our industry."

Rice, who spoke as the representative of the National Automobile Chamber of Commerce, said one of the wonderful things about the industry was the way it had worked together. The forbearance of the members of the M. A. M. A. in a difficult period had been noteworthy, he added.

"We have been going through a sort of moratorium," he said, "and there is much to be said on both sides as to whether the industry should live up to the letter of contracts. It is largely a matter of give and take. The tide has turned but it is not the occasion for too great optimism.

"My own business is better and we can expect a very decent business from now on. That is the message I bring you from the car manufacturers as a whole. We must be efficient ourselves and have everyone connected with us work hard. The increased efficiency of labor in our industry is striking."

In an open forum discussion on business conditions, G. Brewer Griffin, manager of the automotive equipment department of the Westinghouse Electric & Mfg. Co., said the standardization of a product so far as is possible directly benefits both manufacturer and user, as well as the producer of the raw materials that enter into it.

"The matter of standardization is a sensitive spot with many engineers," he said. "The old time engineer felt unless he could design something that did not exist in the heavens above, the earth beneath, or the waters under the earth, he was not performing in a way that would warrant his title of engineer. Possibly this attitude is right so long as the product manufactured is sold and serviced solely by the individual or concern producing it, but just as soon as distribution of such product becomes general and the service requirements are national or international, then the nearer we approach to accepted standards the better it will be for everyone concerned.

"Whether the manufacturer is entitled to furnish all service parts of his original manufacture or not depends upon two things; first, control by patents which would shut out the furnishment by anyone else; but, second, and most important, is whether he is worthy to receive this business and obtain it by the scope and quality of his service and the relations he maintains with his buyers and users. But I wish to state that I am no friend of the pirate parts manufacturer."

A. H. D. Atree, vice-president of the American Bosch Magneto Corp., in speaking of the "Personal Equation in Granting Credit," said:

"Competition is growing more keen every day, and it might almost be said, with very few reservations, that any newcomer into any branch of the automotive industry should not be granted credit unless he can show:

"A—Quality product at an attractive price.

"B—An existing or immediately prospective potential demand.

"C—Ample financial resources to meet his obligations and setbacks.

(Continued on page 583)

Cadillac Model 61 Embodies Design Refinements

Changes include use of 33 x 5 tires, reduced body height and redesigned rear axle. Slight engine changes have been made in connection with camshaft lubrication, water drain valves, and other minor features. The carburetor now has thermostatic control on auxiliary valve.

By J. Edward Schipper

REFINEMENTS in design embodied in the new Cadillac model make for more pleasing appearance, better performance and—in the case of certain parts—longer life. No radical changes have been made. The eight-cylinder type of engine, which has been used since the first car of this type was introduced in 1914, has undergone very few changes. The plan of power transmission also remains fundamentally the same and no basic features of design have been altered.

All Cadillac cars are now mounted on a 132-in. wheelbase chassis. Formerly a 125-in. wheelbase was used to take care of certain body types, but now all are of the same length, permitting of a standardized manufacturing program as far as the chassis is concerned. By the use of wheels equipped with 33 by 5-in. tires in place of the 35 by 5-in. formerly employed, the height has been reduced slightly. Only one engineering change was necessitated by this lowering of the car—decreasing the size of the rear axle housing in order to maintain the same road clearance as in former models.

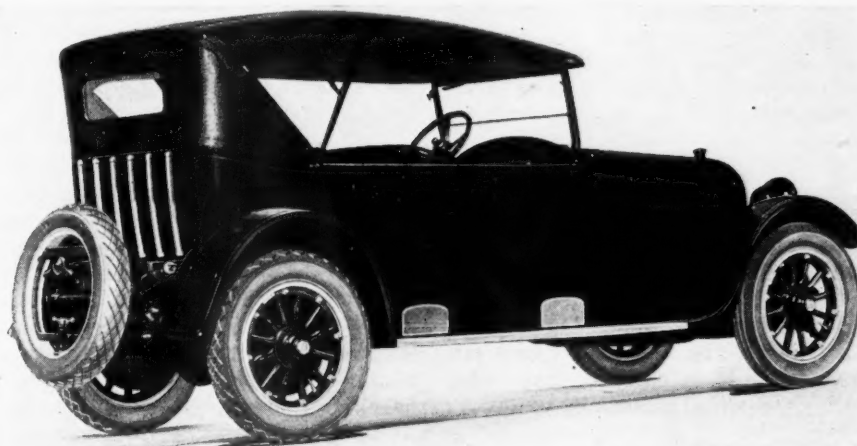
In redesigning the rear axle, increased bearing surface has been provided for the pin on the torque member. In general, the axle is the same as in previous Cadillacs, Timken bearings being used throughout. Bearings are on both sides of the pinion. Three gear ratios are offered, namely, 4 10/11, 4 1/2 and 4 2/13 to 1.

Engine changes are of a detail nature, the only internal alteration being in connection with the oiling system. For camshaft lubrication, the oil is now led through the hollow camshaft instead of through an independent copper lead. Sub-leads were formerly brought from the main lead to the camshaft bearings. In place of these, holes are now drilled in the camshaft at the bearing points, and centrifugal force helps to carry the oil to these. The front end driving chains and the air pump in the gasoline system are oiled from the camshaft. This eliminates the leads

and has the advantage of simplicity. Outside of the change in the camshaft oiling scheme, the oiling system remains the same.

Another change in the engine, made for the sake of convenience and accessibility, is in the arrangement of the water drain valves. It is now possible to open and close the valve at the bottom of the pump by means of an ordinary screwdriver from a position above the frame. An indicator dial showing the position of the valve is now in plain sight. It bears three inscriptions—fill, close and drain. The circulation of water to each cylinder

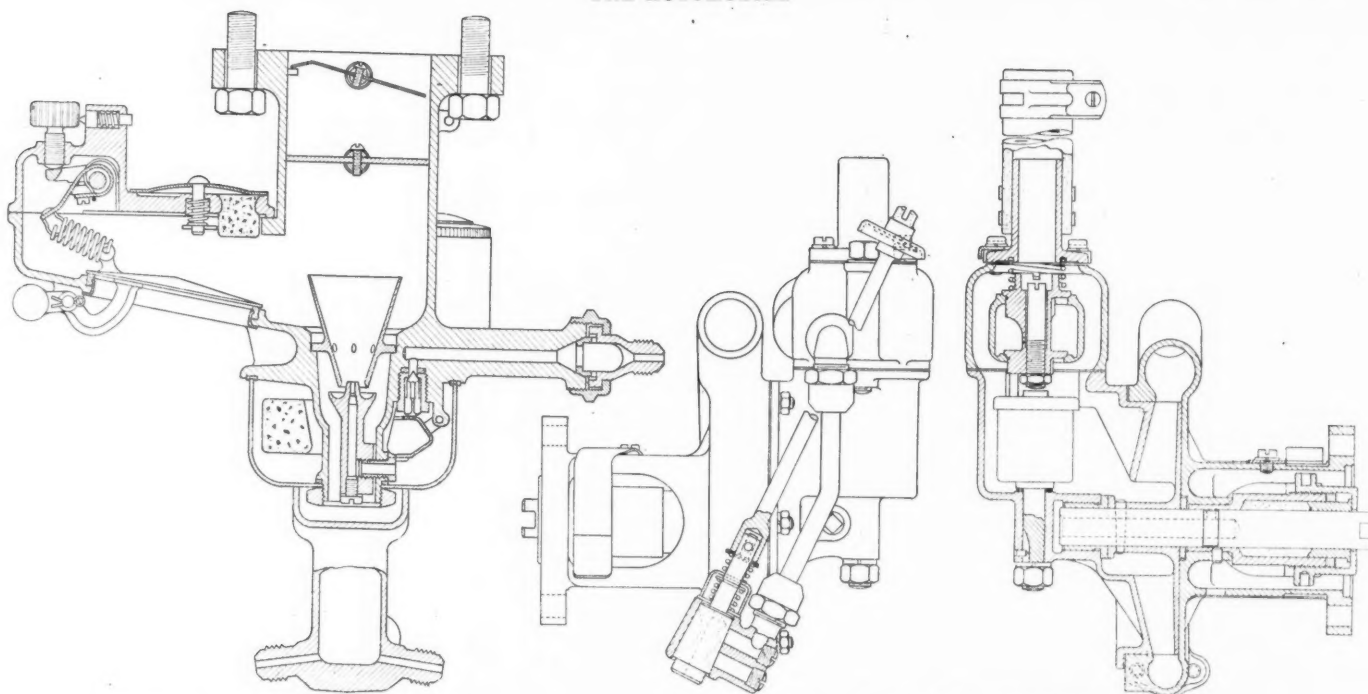
block is independent, as there are two independent pumps. Thermostatic control of the cooling liquid is continued, with improvements. Instead of the valves being mounted directly on the syphon thermostat as formerly, there is now a connection with a sort of universal action, so that any warping of the syphon can-



A smaller wheel gives the new Cadillac lower body lines

not cock the valve on its seat. The housing containing the syphon thermostat and the valve is located on the cover of the water pump. In draining the water system, it is necessary to force the thermostat valves from their seats. This is taken care of by the shaft operated by the screwdriver in draining the system, and when the dial is in the *drain* position the drain port is not only open at the bottom for the water to flow out, but the thermostatic valve is also lifted from its seat. The condenser, the purpose of which is to prevent the loss of anti-freeze solution by evaporation, which was used on former models, is still employed.

Changes in the carburetor (which now has a 2-in. intake) include the provision of thermostatic control for the tension on the auxiliary air valve spring and also for regulating the effectiveness of the accelerating pump, which is a feature of the Cadillac carburetor. Referring to the sectional view of the carburetor, it will be noticed that the manual setting for the air valve is continued, but



Sectional view through carburetor

Two views of the water pump

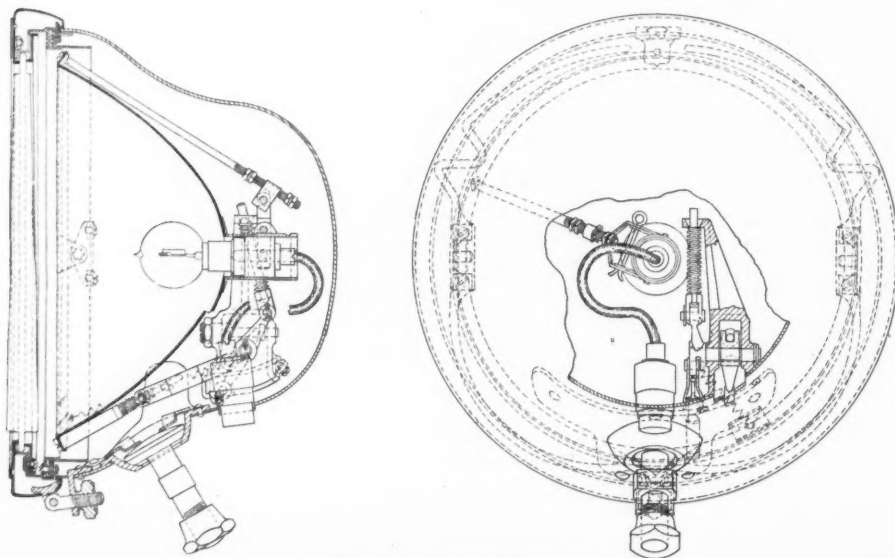
superimposed on this manual setting is a thermostat which alters the tension on the air valve spring in accordance with temperature requirements. On a cold engine, the spring tension is increased, thereby causing increased resistance to the opening of the auxiliary air valves; in warmer weather the effect is the reverse, thus tending to make the mixture leaner.

The thermostat on the accelerator pump, which is located in the fuel chamber, operates a shutter which covers and uncovers a vent, thus increasing the effectiveness of the pump when the engine is cold, and decreasing it when the engine is warm. The object of this acceleration pump or throttle pump is to force gasoline through the spray nozzle when the throttle is opened quickly for acceleration. When the throttle is opened slowly, the pump has practically no effect on the gasoline. The throttle pump is inter-connected with the throttle and its function is to force compressed air into the float bowl. When the thermostat comes into effect and opens the vent, the pump operation is materially reduced. It is claimed that these changes reduce the warming-up period materially.

In the electrical equipment of the car there have been some minor changes. A two-pole generator is used instead of four-pole. Tilting headlights are continued, but have been materially changed in design, for durability and simplicity. The headlights are now mounted on a tubular cross-member which extends across the entire front of the car at midheight of the radiator. The headlamps are mounted on posts which permit of individual adjustment of each lamp. The tilting mechanism for the reflector has been improved so that wear in the operating linkage does not affect the uniformity of tilt in the reflectors. This is accomplished by so arranging the tilting mechanism that it swings over a center to a uniform degree.

Chassis lubrication has been improved by the use of better grease cups in some places and the elimination of others. Grease or oil lubricated bearings on the clutch and brake pedal shaft, clutch release shaft and brake rocker shaft are replaced by bronze bushings with graphite inserts. In the new type of grease cup, a tight fitting piston operating within a cylinder forces grease to the bearings under a pressure claimed to be between 300 to 400 lb. per sq. in. The piston in the grease cup is operated by a small wing nut.

A new chain drive adjustment is provided. The Cadillac chain is so designed that when properly adjusted enough play is left in the chain to permit an oscillation of 1 in. at the periphery of the fan. The adjustment is by means of an eccentric sprocket shaft. In the earlier models, the camshaft sprockets were integral and had their bearings directly on the camshaft. This is no longer the case. The camshaft sprockets now rotate upon eccentric surfaces located on a supporting member which is clamped into the crankcase by a locking device. The camshaft also rotates in a bearing carried in this support. By turning the eccentric surface by means of an adjusting worm the center distance between the crankshaft sprocket



The improved tilting headlights

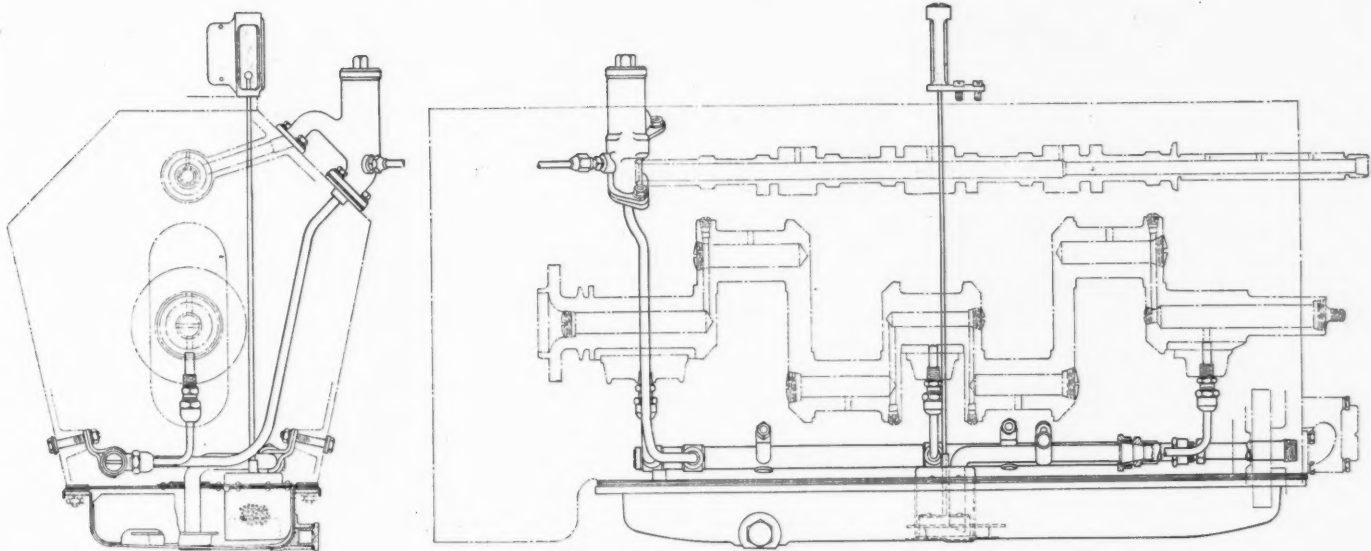


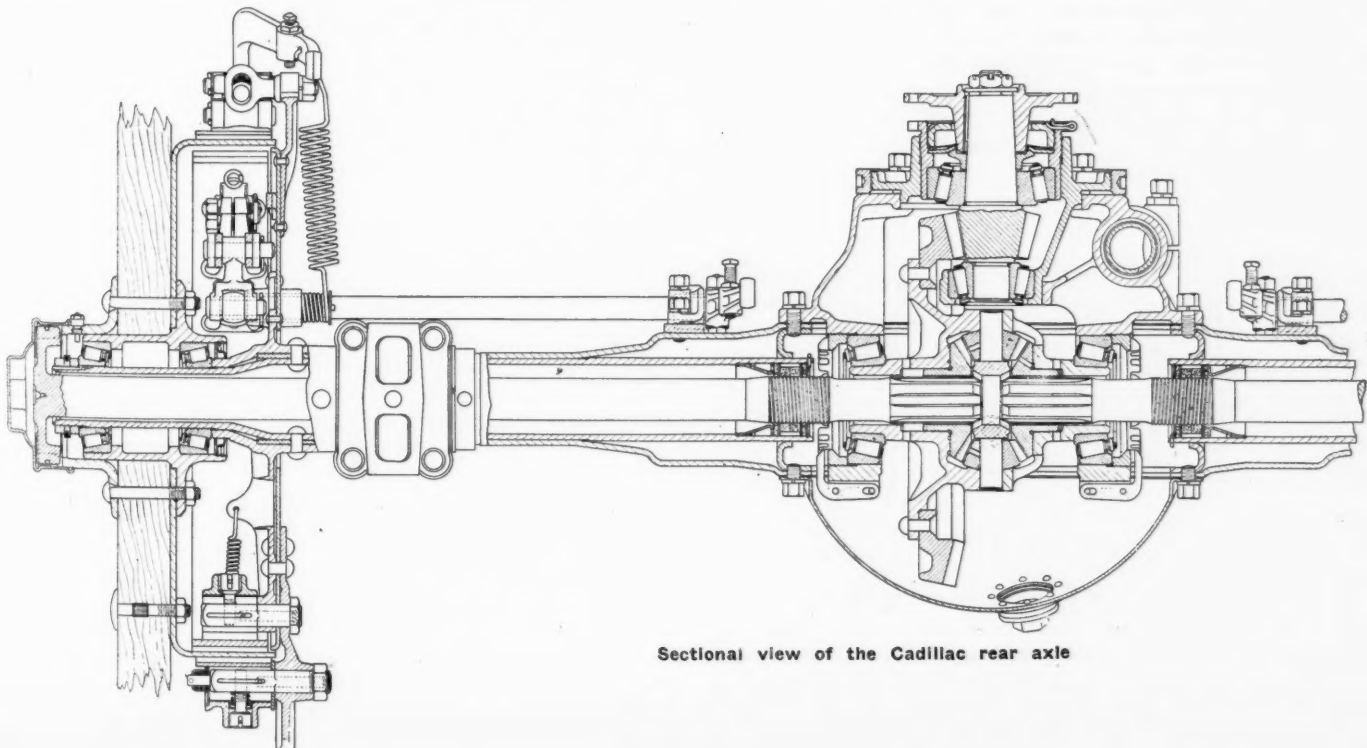
Diagram of engine lubricating system

and the camshaft sprocket, or between the camshaft sprocket and the fan sprocket is increased, thus tightening the chain.

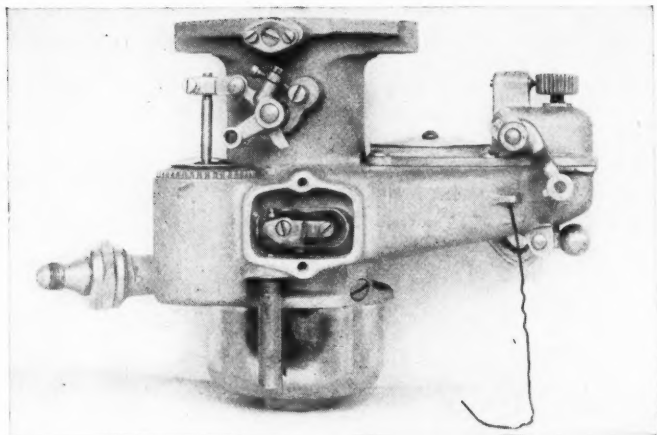
A great many detail changes have been made in the body and fittings of the car. The lowering of the car by the use of smaller wheels is reflected in the appearance of the car. The radiator is higher and the shoulders have been raised and rounded, with the result that the entire front end of the car is enlarged. This improvement in appearance at the front end has been further increased by the use of Bausch & Lomb optical lenses on the headlamps and the small side lamps. The lines of the fenders have been altered and the rear quarters of the enclosed bodies have been changed by greatly reducing the radii at the corners. Two new body styles have been added to the Cadillac line, a two-passenger coupe resembling the roadster in seat arrangement and storage space, and a four-passenger coupe in which entrance to the rear seat is secured by tilting the seat on the right side.

The body interiors have been entirely redesigned, particular care having been used in the selection of metal for fittings. All of the levers and bright metal interior parts are of Duralumin forgings. Owing to the non-corrosive quality of this material it is also used for windshield wing nuts, door handles, floor boards and kick plates under the doors. With the phaeton and sedan bodies is furnished a trunk rack of the same material, which gives six polished strips of aluminum running vertically on the rear end of the car between the tire carrier and body.

The entire front compartment has been redesigned. All of the fittings have been made uniform, the instrument board having been made to conform with the general scheme of decoration of the car. The steering wheel is now made entirely of selected walnut, even to the spokes. The horn button is of the same wood and the rim of the wheel is molded to fit the driver's hand and is as free from metal as it is possible to make it. The tilting feature of the steering wheel, a characteristic of former Cadillacs,



Sectional view of the Cadillac rear axle

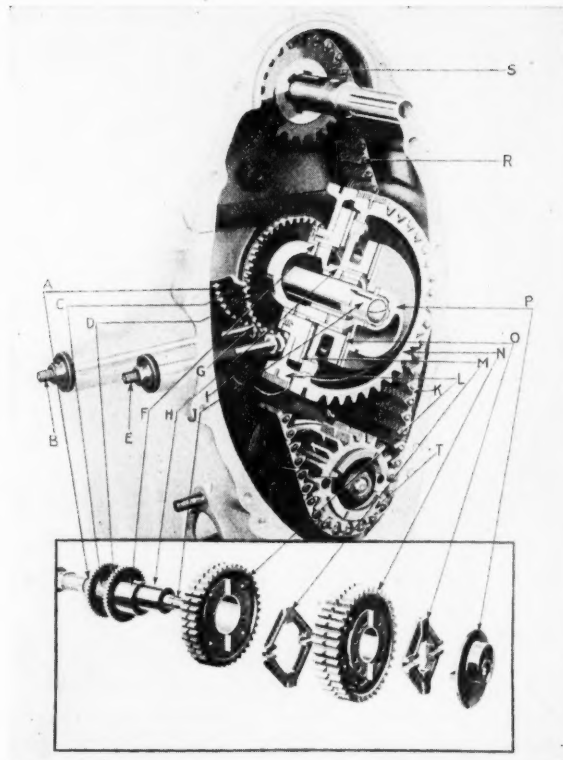


The improved carburetor with thermostatic control

has been discontinued. The spark and throttle lever mounts have been altered; the quadrant has been replaced by a compact arrangement which brings the control in closer to the steering column. Only the finger grips of the new levers are exposed.

The instrument board is convenient and simple. There is a jet black oval plate in the center in which are mounted the switch levers and switch lock. On this plate is the Cadillac crest, finished in enamel and gold. Below the oval plate and at either side are the buttons for controlling the fuel mixture when starting and for deflecting the headlights. The dials of the ammeter and pressure gages are combined in one instrument at the left, which balances a similar circle containing the clock and speedometer on the right. A single lamp is carried directly over the combination switch plate to illuminate the dash. All of the detail work about the front compartment has been gone over. The pedal pads are forgings of Duralumin and the adjustment for the extension of the pedals has been discontinued, for the sake of cleaner design. The hand brake now has a polished nickel grip in place of rubber. A new transmission lock has been provided, supplementing the switch lock, and the switch key fits the transmission lock as well as the tire lock. The ventilator has been increased in capacity and is now operated by one motion of a small lever placed beneath the cowl. A windshield cleaner and an adjustable rear view mirror on the windshield are included in the equipment.

All of these changes have been made without altering the specifications of the car. The price and weight of the car also remain the same.



The Cadillac chain adjustment

Camshaft sprockets N and L are not integral nor do they bear upon the camshaft as in earlier eight-cylinder construction. The camshaft sprockets have their bearings and rotate upon eccentric surfaces H and F of the support C. The support C is clamped into the crankcase by the locking collar A. The camshaft J rotates in bearings carried in the support C. Shafts E and B fitted with worm gears I and G meshing with teeth cut upon the flange D of the support C and with teeth cut upon the collar serve as means whereby the collar A may be loosened or tightened and the support C turned. Turning the support C by the shaft E, which may be done after the collar A is loosened by turning the shaft B in a clockwise direction, raises the sprocket N and lowers the sprocket L as these sprockets have their bearings upon eccentric surfaces of the support C. In other words, the center distances are increased between the crankshaft sprocket T and the camshaft sprocket N and between the fan sprocket S and the camshaft sprocket L. The chains are thus tightened. Camshaft sprocket N is driven from the crankshaft sprocket T by the chain K. Camshaft sprocket L is driven from camshaft sprocket N by a universal cross M through lugs on the inner surfaces of these sprockets. Camshaft J is driven by camshaft sprocket N through the universal cross O and the driver P. The fanshaft sprocket S is driven from the camshaft sprocket L by the chain R.

Fellowships in Highway Engineering and Highway Transport

THE following Fellowships will be awarded by the Board of Regents of the University of Michigan not later than Nov. 1, 1921:

The Roy D. Chapin Fellowship in Highway Transport, which is offered to provide for the investigation of an approved subject relative to highway transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.

General conditions: Each Fellowship pays the sum of \$250 with an allowance of \$50 for expenses. The holders of these Fellowships do not have to pay tuition fees. A

Fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of Master of Science or Master of Science in Engineering. He must be in residence for one of the following periods: First semester (October to February); winter period (December to March); second semester (February to June). An application for a Fellowship must include a concise statement of the candidate's educational training and engineering experience, and three references. Applications and requests for information pertaining to the twenty-five advanced courses in highway engineering and highway transport offered by the Graduate School should be sent to Arthur H. Blanchard, at the University of Michigan, Ann Arbor, Mich.

Many Changes Shown in New Chevrolet

The most important changes in this new model are in the body and its fittings. The front seat has been lowered 4½ in. and the top and back curtains are of new design. Engine and transmission are assembled in a unit. Spiral bevel pinion and ring gear replace straight bevel drive.

A NUMBER of improvements in design have been made in the Chevrolet "Four-Ninety" model, intended to add to the comfort, quietness and life of the car.

Special attention has been given to the steering knuckles, which are now decidedly more robust. The steering knuckle arms are given a heavier section and are fitted to the knuckles with a tapered joint. The pivot bolts are increased in diameter from ½ to 9/16 in. and are mounted in hard rolled bronze bushings. Both bearings on the knuckle are now of taper roller bearing type, with smooth bore. A grease cup is now assembled on the knuckle in such a manner that it is readily accessible for refilling and both the upper and the lower bushings are assured of a sufficient supply of lubricant, it is claimed.

Up to now the Chevrolet has adhered to the straight bevel drive, but the new model carries a spiral bevel pinion and ring gear. The chief advantage of this drive is, of course, its more silent operation, but the spiral bevel gears are also materially stronger. With this kind of drive the end thrust on the pinion is considerably greater, and this has been taken care of by providing the pinion with an annular ball

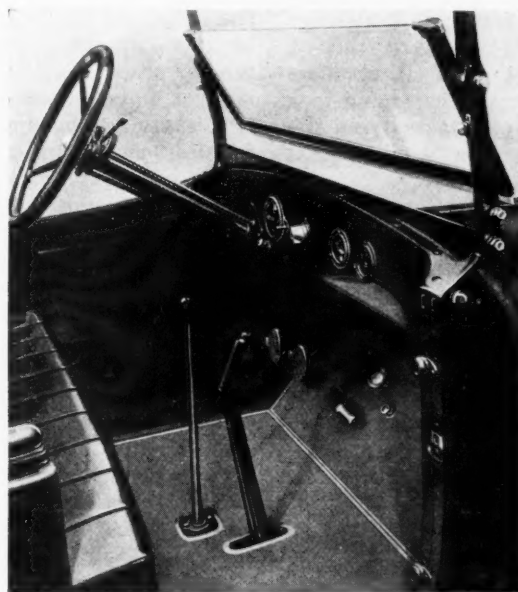
bearing capable of taking a great deal of thrust.

To overcome trouble due to want of alignment between the engine and transmission, these two parts are now

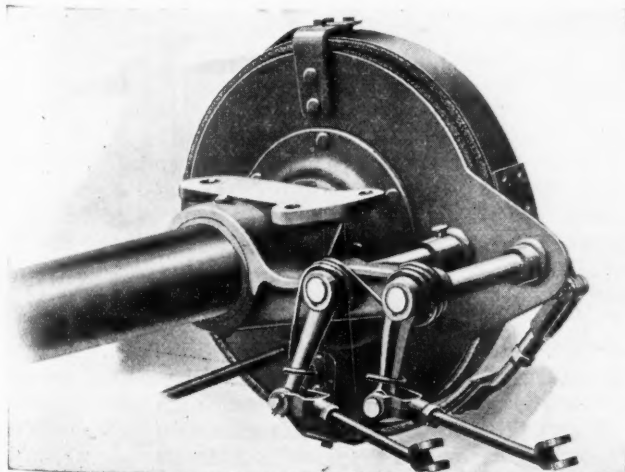
assembled in a unit with the supporting members; they are drilled and assembled in a unit jig which is said to assure alignment within 0.005 in., and it is claimed that this alignment is maintained in use. A hand lever is now provided for the emergency brake, and the pull rod assembly has been redesigned. The brake pedal has also been slightly changed. The brake shaft brackets are reinforced so as to be able to better withstand the pull of the brake cables.

Rather important changes have been made in the body and its fittings, the front seat has been lowered 4½ in., to obtain a higher seat back without increasing the height of the car. To gain more leg room the cushions are placed at an angle, and the steering column has been shortened to correspond to the new position of the seat. For the same reason the windshield has been lowered.

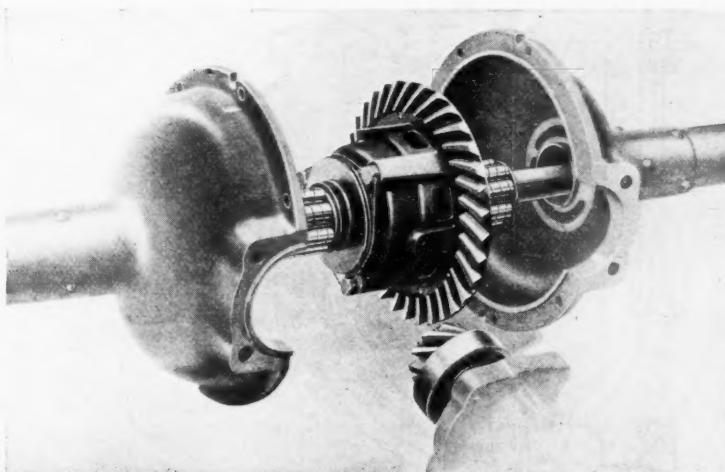
Holton hood catches are now used, the gas tank capacity has been increased to 10 gal., the top and back curtain are of new design, and Gipsy curtains have been added.



Dash and control of Chevrolet "Four-Ninety" showing new hand controlled emergency brake lever



Left brake, complete, showing new brake shaft and brake shaft bracket



Spiral bevel gear rear drive with annular ball bearing on pinion shaft

Springing and Other Refinements in Motorcycle Design

The need for springing of motorcycles, especially when used on rough roads or when heavy loads are to be carried, is emphasized and several types described. Lubrication and other items are discussed.

By G. H. Savage*

AFTER having ridden practically all kinds of motorcycles in France over all sorts of conditions of roads, the author's criticism is that the springs were not responsive at all to the small and average shock, though they came into action for hard shocks, and for the very severe shocks the springs either came up solid, when acting in compression, and the frame took the final blow, or, in the case of the extension type, the springs were overstressed. If a stop was fitted on this latter type, the frame again took the final blow.

The allowable movement from the normal, under load, was on the average from 1 in. to $1\frac{1}{2}$ in. In the author's opinion it is impossible to design a spring with this allowable movement that will be responsive to the full range of shocks. In consequence the springs used were too stiff, parts broke and shook loose, etc., and the springs themselves broke frequently.

With the helical spring acting in extension, on one or two types of machines the top and bottom ends of the

*Extracts from a paper presented before the Institution of Automobile Engineers, London. The author was attached to the British Mechanical Transport in France and had opportunity to observe the performance of motorcycles used on a large scale. The article is based upon observations made under severe conditions of service, both at the front and at base repair shops, where machines were in some cases redesigned as well as repaired and rebuilt.

spring were bolted up solid. The front forks were connected to the head by links, the movement of the forks thus being along the arc of a circle with radius equal to the length of the link. If the two ends of the spring are in line with the spring straight, when the spring is extended under load one end will move along an arc, and it must move out of line with its other end, thus bending or distorting the spring as well as extending it. The angular movement of the spring ends can be altered slightly by having the top and bottom links of different lengths and at different angles in relation to each other, but with these modifications the spring still distorts, and this arrangement has its own objections. In such cases it is usual to have the spring bent when in the normal position, so that it tends to straighten when further extended.

These $2\frac{3}{4}$ -hp. Douglas extension springs broke, as a rule, where the spring commenced to taper near the ends. On the latest Douglas 4-hp. machines the springs are all parallel, and the ends are allowed to swivel on pins; very little trouble has been experienced with this type.

On all the makes, with the exception of the Triumph and Douglas 4-hp., the linkage employed was too light, the chief faults being the small diameter of the spindles

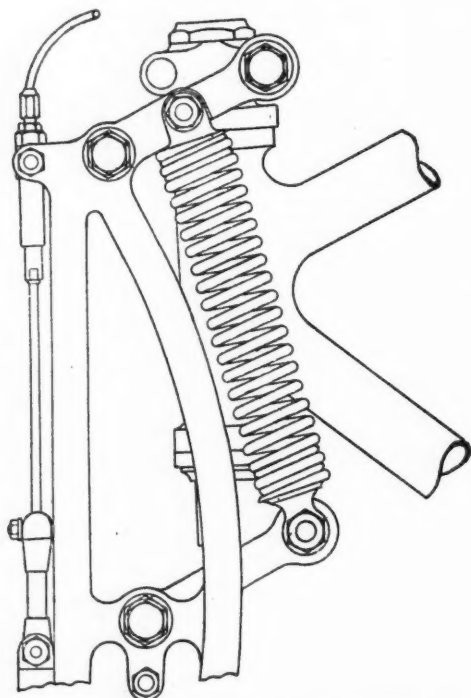


Fig. 1—Douglas front forks with helical springs

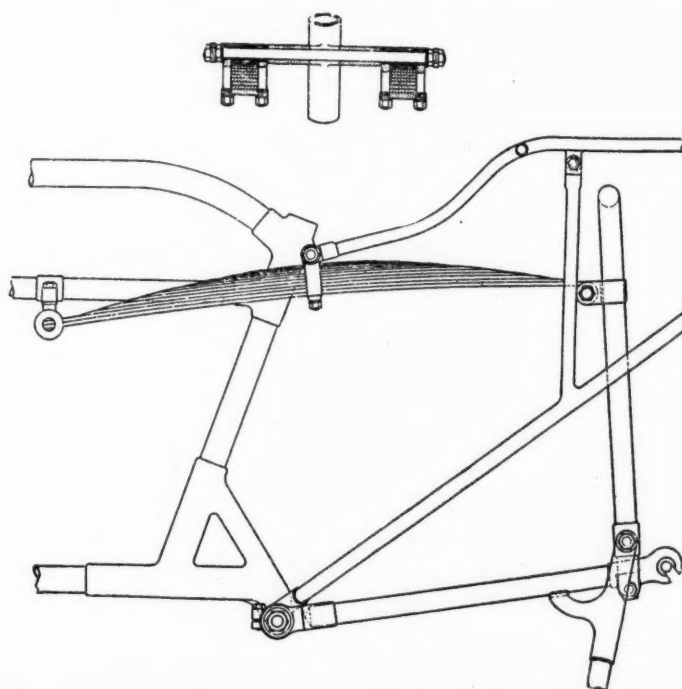


Fig. 2—Springing $2\frac{3}{4}$ hp. model with laminated rear springs

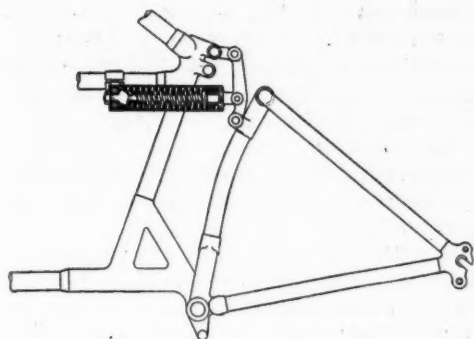


Fig. 3—3 1/2 hp. model with helical rear springs

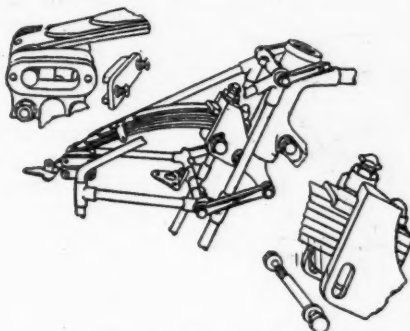


Fig. 4—Front and rear springs on Royal Ruby Standard model

and the lack of a proper method of lubricating them. The author practically never saw a spring linkage taken to pieces, but that the spindles were dry.

On the later type Douglas 4-hp. machine, the spindles are of larger diameter and drilled up, the end of the spindle being screwed, and on this a grease cup fitted; this is a big advance on previous practice, and very little trouble has been experienced with them.

On the Triumph machines the front fork was hinged at the bottom of the fork stem, a ball bearing, which stood up well, being fitted.

Except on the very earliest types of Douglas 2 3/4-hp. machines the author saw practically no cases on any make where the links had bent during ordinary wear and tear. The diameter of the spindle end, the thickness of the link at the eye, and the face on the spindle which the link came up against were all too small, and once the link started working at the eyes it usually meant new links and spindles to make a satisfactory job. The surfaces for taking side pressure were small, though any play developing could be taken up by washers, and later in the war some makers fitted hardened steel washers. The use of double coil flat spring washers between the faces of the castings and of the links was a good arrangement.

Saddle springs stood up well, but chiefly because the saddles bumped before the springs were overstressed.

A Douglas 2 3/4-hp. machine with two rear springs, one on each side of the rear wheel, is shown in Fig. 2. The forward ends of the springs rest on a bracket about 8 in. along the middle rail, the center of the springs being hinged to the seat pillar lug, and the rear ends attached to a stay that went over the wheel. The author did not test this machine himself, but has been told that the early reports were good. The next experimental Douglas machines that came out were 3 1/2 hp. machines, fitted with helical rear springs, as shown in Fig. 3. The spring cages showed that the spring had been deflected to the end of its travel often and fairly hard. The machine was good and very comfortable to ride, but the springs were too stiff to be responsive to the light shocks.

Another spring frame machine tested was the Royal Ruby. This machine differed from the latest model shown in Fig. 4, chiefly in the position of the rear spring. It was approximately vertical then. It is now horizontal. The shackles were also different, but the front spring was much the same. This machine, as it came to the author, had had some fairly severe work to do. The only criticism was that the wheels were a little out of track and care had to be exercised when riding the machine. The machine was very comfortable, and very much less tiring to ride than one with a solid frame.

Another design of rear spring was especially fitted to a standard Triumph machine, the general arrangement of which can be seen in Fig. 5. The carrier and rear mudguard were unsprung. The spring had a flat end,

with no eye or shackle, but behind the end was a cross bar, which engaged the spring on rebound. The difference between the riding qualities of this machine and those of a standard Triumph was enormous.

As higher speeds became more common the springing must be developed not only for comfort but to enable the mechanical details to better stand up to their work. It does not appear that this should add much to the cost of the machine as there will certainly after a time be a saving by making the whole machine lighter. But even if the first cost is greater, the springing if well designed should be a great asset.

Manufacturers should decide upon the permissible movement from the normal under load for the front and rear forks of the machine. The author suggests 2 1/2 in. to 3 in. for the front forks and 3 1/2 in. to 4 1/2 in. for the rear. The Beardmore Precision Co. informs the author that they have experimented with larger deflections than they at present allow on their standard spring frame machine, Fig. 6, and have rejected them. They found that the movements were, in their opinion, too great for the short wheelbase of a motorcycle, that the periods were too slow and the springs too heavy. On their standard machines they allow a maximum movement of about 1 1/2 in. for the front wheel and 2 in. for the back wheel.

The Royal Ruby Cycle Co. says that the maximum allowable movements are about 3 in. on front and rear wheels. The Beardmore company says that in its experience the steering is hardly affected by the large movements. This agrees with my own experience.

A considerable number of machines are now fitted with both horizontal and vertical springs on the front forks. The wheel is thus sprung in two directions. That these springs do useful work can be appreciated by rid-

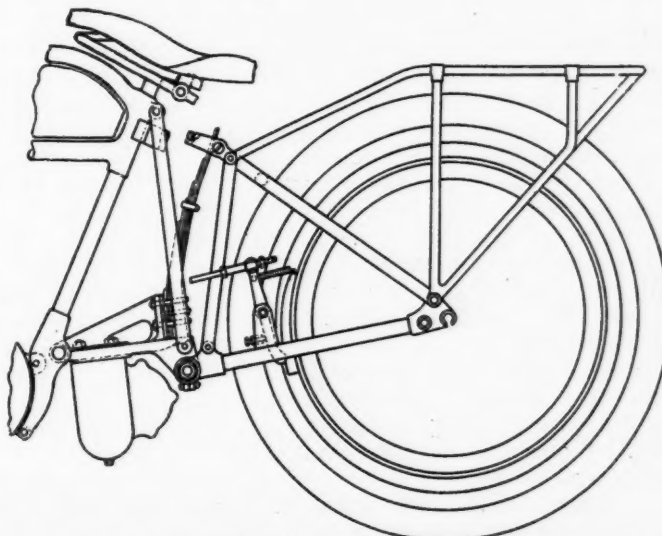


Fig. 5—Rear spring as applied to Triumph machine

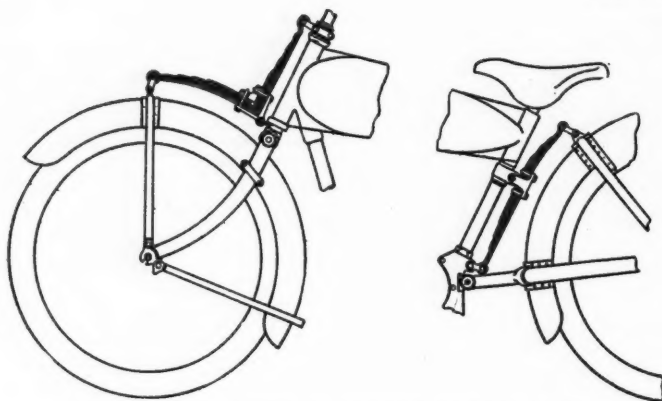


Fig. 6—Springing used on standard model of Beardmore machine

ing a machine so fitted. In the author's opinion, however, these are only useful when vertical springs are too stiff, that is, on a front fork fitted with reasonably flexible springs the horizontal springs would not be required, especially as the motorcycle front forks are already at an angle of about 30 deg. to the vertical.

There are three distinct types of front forks. The most usual is the parallel link type, where the links connect from the top of the front forks to the head of the frame. Then comes the type used on the Triumph and the B.P., where the front fork is hinged at the crown, and lastly the design which seems to be popular on American machines, and which is also embodied in the Phelan and Moore front forks, where the connecting link comes straight off the wheel spindle. It would be hard to say which type is best, as they are, in common with most engineering problems, a compromise of the three; the author prefers the first mentioned, where the links bridge from the top of the front forks to the head. The bearings in this type are long, easy to lubricate, easy to adjust, accessible, simple and out of the dirt, and in practice they stand up quite well. The tendency now is to make the link spindles of larger diameter, as on the Douglas type shown in Fig. 7. This is a move in the right direction. The spindles will, however, stand still further increase in diameter. Some makers are also providing an easy adjustment for taking up any side play that develops. This is satisfactory as long as it insures that the links are still held solidly on the spindle ends, or on a connecting tube in some designs. The links are preferably screwed up against shoulders. In the type of front fork used by Triumph a large proportion of the road shock must be transmitted direct to the frame, or at any rate a great deal more than on the other two designs mentioned. The more flexible the spring, however, the less will this be felt. When the front fork is hinged at the steering crown, there is the advantage of only one bearing against four, see Fig. 8, and this bearing can be made long and of large diameter.

On the P. & M. and American type there is the advantage, when using helical springs, that the angular movement of one end of the spring in relation to the other when being compressed or extended is less than with the first mentioned link type. Another advantage is that there will be slightly less unsprung weight. When the wheel is in front of the bearing it hinges from, it appears that one advantage of this type is destroyed; if the wheel is behind the bearing, it is trailing, and its position could be such that it would be readily responsive to road shocks from a large range of directions.

Whether to make the springs adjustable for different weights and for bad roads is a question. The Royal Ruby Co. embody such an adjustment in their machine,

as shown in the lower part of Fig. 4, and it is without doubt a desirable refinement. If, however, a low priced machine is being built, the author thinks it unnecessary.

Rear springing on a motorcycle is a comparatively new feature. The considerations in the design seem to be accessibility for viewing, repair and lubrication, efficiency, clean appearance and cheapness. The maximum allowable movement from the normal should, the author thinks, be from $3\frac{1}{2}$ to $4\frac{1}{2}$ in.

Vitally connected with the problem of rear springing is the practice which is becoming more usual each day—that is, transporting an extra passenger on the carrier. It seems absolutely unreasonable to expect the manufacturer to design a machine to give good springing with one passenger, and also with two passengers, one sitting on the carrier. It is, as a matter of fact, impossible. The author prefers the leaf spring. Satisfactory designs have, however, been got out with helical rear springing, and there is no reason why they should not give very efficient results. The helical rear springs on the Douglas $3\frac{1}{2}$ hp. machine are shown in Fig. 3. The author has ridden one of these machines and found it very comfortable and well made. The only criticism is that the springs were, of necessity, rather stiff, the allowable movement of the wheel being small. Another machine which has helical rear springing is the Matchless. On this type at present the ends of the springs are held solidly. In the normal position they are out of line, and as the spring is further compressed they move into line. The carrier is sprung on this machine, so that if an extra passenger is transported the springs on the rear wheel have to support the extra weight.

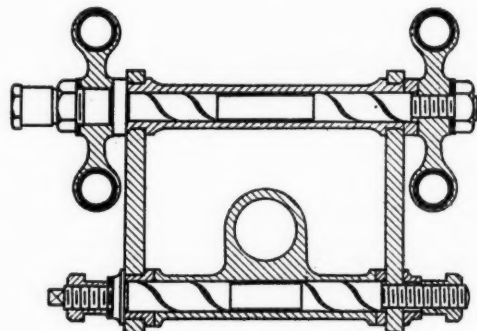


Fig. 7—Front fork links and spindles used on Douglas machines

Saddle springs act as supplementary springs or shock absorbers for the rider only. These saddle springs are part of the springing, but it does not follow that supplementary springs would not be desirable in combination with the main spring, or that the main spring can be stiffer, for in this case the power unit, gear box, etc., which weigh about one and a half times as much as the average rider, would still be badly sprung, and apart from the bad effect of road shock to these units, the rider would feel the vibration. What should be aimed at is to spring the machine and rider as perfectly as possible, and simply look on the saddle springs as the equivalent of the cushion springs on a car.

It would undoubtedly be preferable to have the carrier as sprung weight, providing the machine is ridden solo. If it is sprung it saves the carrier bags and their contents considerably. While the present tendency of carrying an extra passenger continues, the carrier must be unsprung, as a protection to the manufacturer.

The backstand should, if possible, be sprung, thus doing away with the clip on the rear of the mudguard, which is intended to hold the stand up. This spring clip is now being replaced by a positive screw fixture,

but this is a nuisance and is always exposed to the wet and dust.

On the majority of machines the main spindle bearing is a plain bearing (examples of which are shown in Fig. 9) though on at least one design ball bearings have been fitted. All these bearings should be of considerably larger proportions, and as long as possible, and ample faces for the side thrust should be allowed. This bearing is an extremely important feature; if it develops wear soon (possibly through not being well lubricated, or through careless usage) slack, which will destroy the balance of the machine, will be set up. On account of the under lubrication which this main spindle bearing, in common with all others, will undoubtedly receive, the author favors ball bearings as on the Beardmore Precision machine.

The main bearing should be as near to the center of the gearbox pulley or chain wheel as possible. In the normal riding position the center of the wheel should be $1\frac{1}{2}$ in. to 2 in. below a line produced from the gearbox pulley through the center of the main spindle bearing. Actually, the shortening of the distance between the gearbox pulley wheel and the wheel center is practically negligible even with a 4 in. movement, and the author has never had trouble with a belt slipping on this account. A belt is elastic, and a chain never runs dead tight. Wheel spindle bearings had to be replaced very often. They were not large enough to long withstand vibration.

Some makers are seriously considering lubrication facilities. A great many, on the other hand, even on their latest standard models, fit lubricating means which are useless. They do not seem to realize that unless it is possible to lubricate the part with absolute minimum of trouble to the rider, and unless the system is efficient, the part will go unlubricated. The design in which there is simply a small oil-hole, covered by a pivoted flat spring, is bad in practice, as the oil can end never fits the hole and the hole also holds practically no oil, and in consequence most of it simply runs over the outside. Fitting absurdly small grease cups is another favorite practice. The author favors an oiler with the hinged lid, which is ideal for the lazy man, or a grease cup of reasonable dimensions.

During the war, in France, frames were a constant source of trouble through the tubes breaking, or the frames themselves distorting and twisting; the front down tube was the weakest point and it usually broke just below the head lug. It is possible that the heating in the process of brazing would, by annealing the tube, destroy some of the extra tensile strength of the solid drawn tube. In any case tubes of a heavier gage stood up to their work much better.

The front fork stems broke very seldom, but the same cannot be said for the ball races in the head. These were very poor, and after every 200 or 300 miles riding play developed and the races had to be adjusted. When

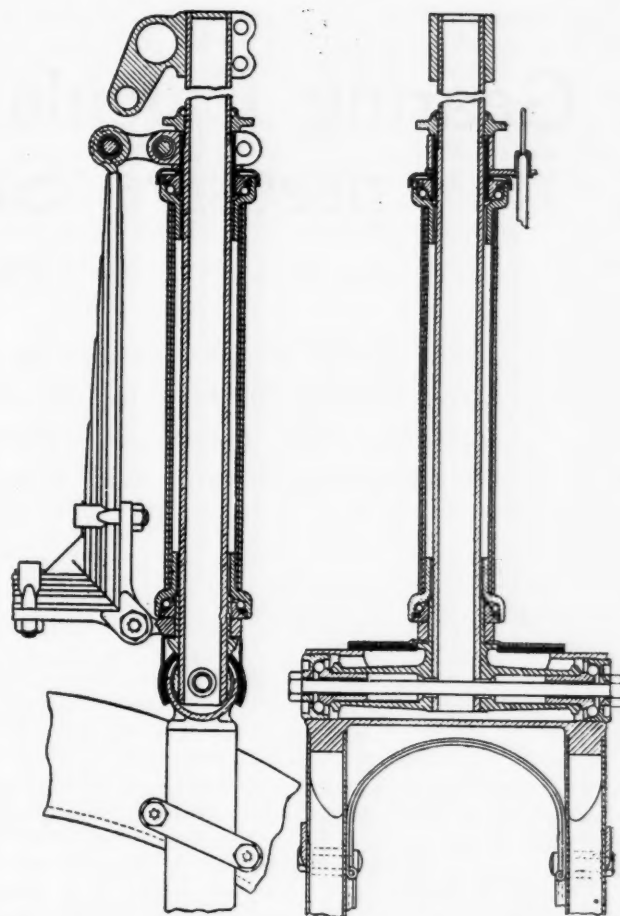


Fig. 8—Front fork construction used on Beardmore machines

this had been done several times it would be found that all the side play could not be taken up and new races were necessary.

Repairing wheels and scrapping them kept a small army of men busy. While many were damaged in collisions, their number was small compared with those that failed through average running. Practically every rim that came in was badly dented. The spokes were loose and often broken, which of course did not help the rim to stand up to its work, but both were at fault, as the spokes were too light a gage. Later on they were made heavier by some manufacturers.

Mudguards had to be replaced very often, as they either broke or cracked and tore away at the point where they were attached to the frame and stays; the method of attachment was usually very poor, and does not seem to have received the attention it deserves at the hands of the designer.

It is generally agreed that larger tires are more economical in the end and give easier riding.

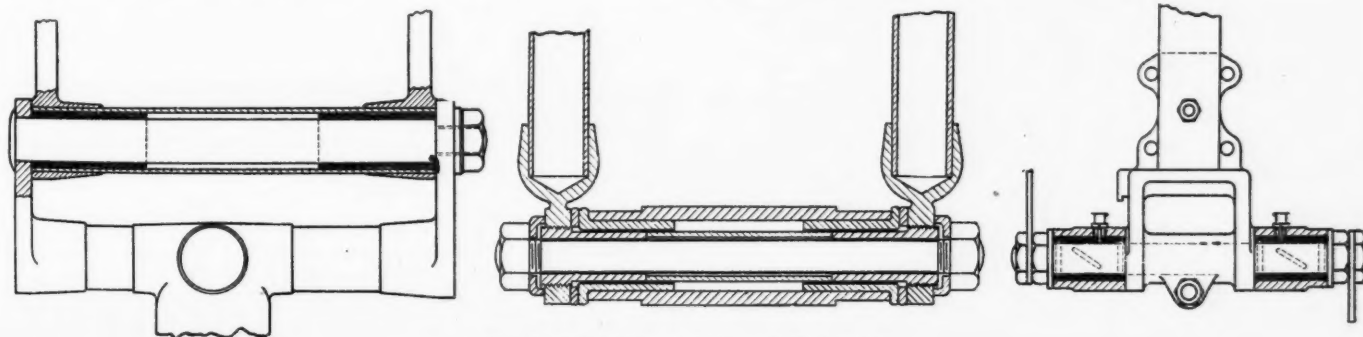


Fig. 9—Examples of main spindle bearing

Gearing Calculations by the Compressive Stress Method

Part II

The capacity of gears cannot be accurately determined by the bending stress method for bending stresses are not a true measure of wearing qualities. The maximum surface pressure, or compressive stress, must be considered if tooth wear is to be kept within proper limits.

By Joseph Jandasek*

GEARS cut from cast iron or cast steel are not used in vehicle construction for transmitting any great loads. However, for the sake of completeness, and also to clarify the compressive stress method, the values for allowable compressive stresses for cast iron are given in Table I. Here we can see that while the factor of safety for bending stresses at low speed, up to 100 ft. per min., is about 3—the maximum allowable bending stress being 8000 lb. per sq. in.—the safety factor for compressive stress is only about 2, the maximum allowable stress being 55,000 lb. per sq. in. However, where it is necessary continuously to transmit almost 100 per cent of the full load, the maximum compressive stress must be reduced to 32,000 or 33,000 lb. so that the safety factor for compressive stress for cast iron will be 3 also.

As for gears cut from soft cast steel, unhardened, their teeth can be subjected to static bending stress up to 20,000 lb. per sq. in., leaving the safety factor about 3 as far as strength is concerned. Checking for capacity, however, this corresponds to a compressive stress of about 125,000 lb. per sq. in., which is entirely too high for cast steel untreated. This fact has been confirmed by practice, which shows that soft steel gears are not suitable for the continuous transmission of heavy loads, because of their rapid wear.

If, for some reason, unhardened steel is to be used for gearing, a maximum compressive stress of 40,000 lb. can be allowed for ordinary cast steel and 50,000 lb. for high carbon cast steel, and teeth proportioned on this basis will be durable.

*Engineer, Republic Motor Truck Co., Inc.

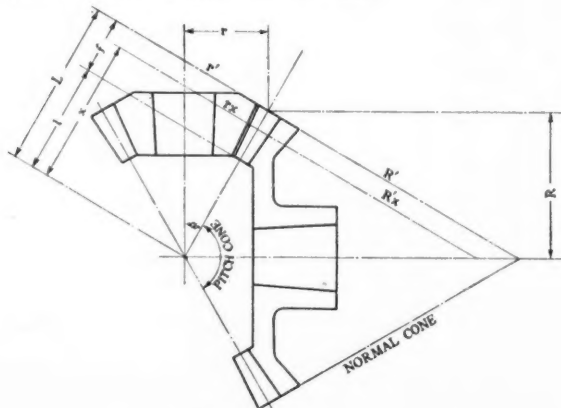


Fig. 15—Diagram of bevel gear set

Capacity of Bevel Gears

The bevel gear tooth decreases in pitch uniformly from the outer end, where the pitch has the nominal value, to the apex of the gear cone. In Fig. 15, r' and R' represent the pitch radii on the normal cones and r and R are the pitch radii. L represents the outer pitch cone radius, l the inner pitch cone radius.

Now let us take any infinitely small section at the point X of the tooth at the distance x from the apex. The tangential pressure dW_c which this section sustains is also infinitely small and can be found by equation (6), because for an extremely narrow width of face dx bevel gears can be treated like spur gears, the only difference being that the pitch diameters on surfaces at the section dx of the normal cones are used in place of pitch diameters in the case of spur gears.

Thus for the section dx we have:

$$dW_c = 10^{-8} C_x^2 p_x dx \frac{n_x}{1 + \frac{r'_x}{R'_x}} \text{ for compressive stresses, and}$$

$$dW_b = S_x dx p_x y_x \text{ for bending stresses,}$$

where the index x means that the value of each particular dimension ought to be taken to correspond to section dx .

From Fig. 15 we see that the values of r_x , R_x , C_x , S_x , p_x decrease uniformly from the outer end to the apex. Hence

$$\begin{aligned} C_x &= \frac{x}{L} C & p_x &= \frac{x}{L} p \\ S_x &= \frac{x}{L} S & y_x &= y' \\ r'_x &= \frac{x}{l} r' & n_x &= \frac{n}{r} r' \\ R'_x &= \frac{x}{L} R' & a_x &= \frac{r'_x}{R'_x} = \frac{r'}{R'} \end{aligned}$$

Of the above y_x is constant for any section, depending only on the number of teeth

$$n' = \frac{n}{\cos \alpha} = n \sqrt{1 + a^2}$$

a_x is a constant.

Therefore,

$$dW_c = 10^{-8} C^2 \frac{x}{L} p \frac{x}{L} dx \frac{n r'}{r \left(1 + \frac{r'}{R'} \right)}$$

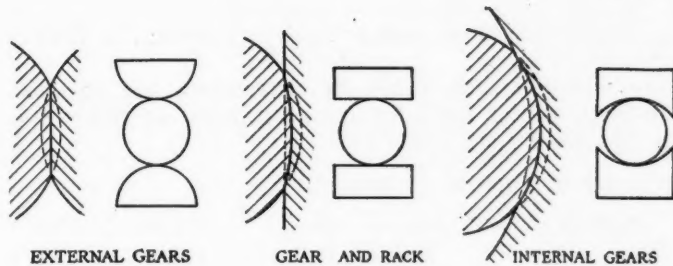


Fig. 16—Diagram of contact relations in spur gears, pinion and rack and pinion and internal gear

and

$$\frac{r'}{L} = \frac{r}{R} = a = \frac{r'}{\sqrt{r^2 + R^2}}$$

$$\frac{R'}{L} = \frac{R}{r} = \frac{1}{a} = \frac{R'}{\sqrt{r^2 + R^2}}$$

Then

$$r' = \frac{r}{R} \sqrt{r^2 + R^2} = r \sqrt{1 + \frac{R^2}{r^2}}$$

and

$$\frac{r'}{R'} = a^2 = \frac{r^2}{R^2} = tg^2 \propto \dots \dots \dots (9)$$

Hence $r' = r \sqrt{1 + a^2}$

Substituting this in the equation for dW we have,

$$dW = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \frac{x^2}{L^2} dx$$

$$W = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \int_l^L \frac{x^2}{L^2} dx$$

$$W = 10^{-8} C^2 p \frac{n}{\sqrt{1 + a^2}} \left[\frac{L^3 - l^3}{3L^2} \right]$$

Placing $L - l = f$

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} \left[\frac{1}{3} + \frac{l}{3L} + \frac{f^2}{3L^2} \right]$$

lb. per sq. in. (for bevel gears).

And, finally, for calculating the capacity we get,

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} B \dots \dots \dots (10)$$

where n = number of teeth in pinion,

B = reducing face factor.

The capacity of bevel gears is expressed by almost the same formula as the capacity of spur gears, the only difference being that $\sqrt{1 + a^2}$ is put in place of $(1 + a)$ and the whole expression multiplied by coefficient B .

In a similar way we can find the equation for calculating the strength of bevel gears according to bending stresses:

$$dW_b = S_x p_x dx y'_x$$

$$W_b = Sp y' \int_l^L \frac{x^2}{L^2} dx$$

If we integrate this expression between limits $x = l$ and $x = L$ and again place $f = L - l$ we obtain for the strength

$$W_b = Sp y' f b \dots \dots \dots (11)$$

(for bevel gears).

To be absolutely correct equations (10) and (11) should also contain a factor depending upon the number of teeth in contact at a time, which factor varies but slightly, and a factor representing influence of speed, which unfor-

tunately is uncertain. The uncertainty regarding the influence of these two factors on the strength of the gears makes it permissible to neglect them.

As regards the maximum allowable compressive stress C and the bending stress S for straight bevel gears, these cannot be taken as high as for straight spur gears, because the increment load and the pressure on the face are larger, owing to the greater inaccuracy, the misalignment and the more difficult adjustment of the mesh.

Comparison of Compressive and Bending Stress Calculation

We will now compare the calculation of gears by the compressive stress method, the applied load being W_c , and by the bending stress method, the applied load being W_b .

For W_c we have (equation 6)

$$W_c = 10^{-8} C^2 pf \frac{n}{1 + a} \text{ lb.}$$

(for steel spur gears with a 20 deg. pressure angle) and for W_b

$$W_b = Spf 1.25 \left[0.154 - \frac{.912}{n} \right] \text{ lbs.} \dots \dots (12)$$

(for stub teeth with a 20 deg. pressure angle). By equation (10),

$$W_c = 10^{-8} C^2 pf \frac{n}{\sqrt{1 + a^2}} B$$

(for bevel gears with a 20 deg. pressure angle).

For the specific load per inch of circular pitch and per inch of face at the same velocity we have:

(for spur gears)

$$\frac{W_c}{pf} = 10^{-8} C^2 \frac{n}{1 + a} \text{ lb. per sq. in.} \dots (13)$$

(for stub tooth spur gears)

$$\frac{W_b}{pf} = S 1.25 \left[0.154 - \frac{.912}{n} \right] \text{ lb. per sq. in.} \dots (14)$$

(for bevel gears)

$$\frac{W_c}{pf} = 10^{-8} C^2 \frac{n}{\sqrt{1 + a^2}} B \text{ lb. per sq. in.} \dots (15)$$

In a similar way we can find the specific load per inch

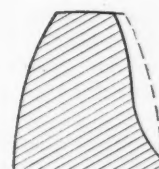


Fig. 17—Showing how wear changes the involute tooth outline to a cycloidal outline

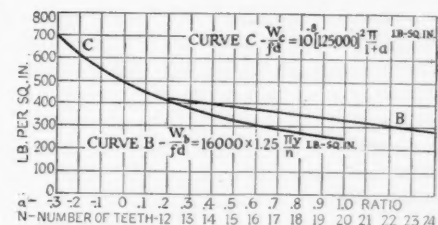


Fig. 18—Variation of allowable bending and compressive stresses with gear ratio and number of teeth

of diameter and per inch of face at the same velocity: (for spur gears)

$$\frac{W_c}{fd} = 10^{-8} C^2 \frac{\pi}{1 + a} \text{ lb. per sq. in.} \dots \dots (16)$$

(for stub tooth spur gears)

$$\frac{W_b}{fd} = S_o \frac{1.25\pi}{n} \left[0.154 - \frac{.912}{n} \right] \text{ lb. per sq. in.} \dots (17)$$

(for bevel gears)

$$\frac{W_c}{fd} = 10^{-8} C^2 \frac{\pi}{\sqrt{1 + a^2}} \text{ lb. per sq. in.} \dots (18)$$

Now we can proceed with a comparison of the two methods and their results.

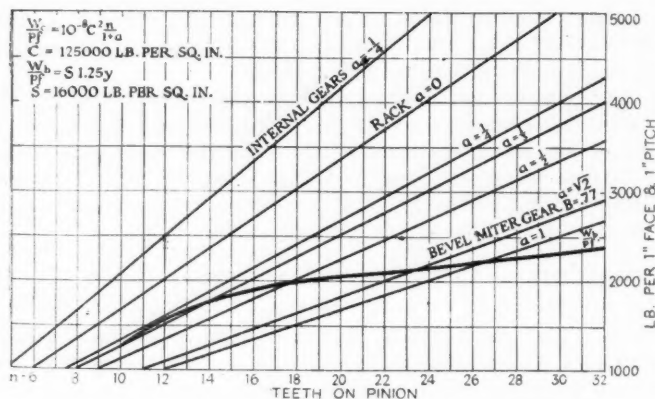


Fig. 19—Variation of safe load per inch of face per inch of pitch with number of teeth

Keeping the gear diameter and ratio constant and considering solely the bending stresses, the designer can select either a wide gear with thin teeth or a narrow gear with thick teeth (see Fig. 1). The dimensions of face and pitch can be determined from equation (12) in such a way that the bending stress S is kept constant, hence the strength of the tooth remains the same, while it is evident that the compressive stress C in a comparatively narrow gear will by far exceed that in a wide gear; because, according to equation (4),

$$W_c = \text{const.} \frac{fr}{1+a}$$

Hence, keeping r and a constant, the allowable load decreases with the face width,

$$W = \text{const.} f$$

Influence of Ratio

The same pinion when meshing with a large spur gear possesses a greater capacity than when meshing with a small one. When meshing with another gear of the same size (ratio $a = 1$), the capacity W_c of a gear is only one-half as great as when meshing with a rack, for which case $a = 0$, while the strength per inch pitch and per inch face for a gear with a definite number of teeth is constant (see equations 14 and 17) and the capacity W_c is only $1/2.7$ as great as when in mesh with an internal gear of the ratio 1:4. This is a case similar to that of ball bearings in which we curve the inner and outer races in order to obtain a larger area of contact between balls and races, and thus obtain the maximum capacity for a given size of bearing. (See Figs. 16 and 17.)

This explains why we must use large gears for a ratio of 1:1 and it also explains why there is so much grief with mitre gears for the pulley drive on farm tractors. The capacity of mitre gears is only about 70 per cent that of bevel gears with a larger ratio (see Fig. 18). From equation (15) it may be seen that in the case of bevel gears the capacity remains almost constant for a large part of the range of ratios and drops quickly when close to the ratio 1:1.

Example 1: We found that for a certain compressive stress C , a 13-tooth pinion is satisfactory when working with a gear of four times the number of teeth. What is the number of teeth required for different ratios so that the compressive stress may remain constant?

The condition is

$$\frac{n}{1+a} = \frac{13}{1+1/4}$$

Generally, comparing with formula (16)

$$\text{(for spur gears)} \quad \frac{n}{1+a} = \text{const.} \dots (18)$$

$$\text{(for bevel gears)} \quad \frac{n}{\sqrt{1+a^2}} = \text{const.} \dots (19)$$

from which equations can be determined the smallest number of pinion teeth for any given ratio, or vice versa. For the results see Table IV.

Influence of Quality of Material

Owing to the fact that the capacity W_c of gears increases with C^2 , materials of higher ultimate strength stand much more wear than those of lower ultimate strength.

While the allowable load W_c per inch diameter and per inch of face is constant for each ratio a (see formula 16), the strength W_b decreases as the number of teeth increases (see formula 17). Consequently, for a definite ratio and a given value of S there is a minimum number of teeth n for each particular ratio if the compressive stress C is not to increase above a certain safe value (see Fig. 18). Thus gears with a very small number of teeth, though they may be amply strong as regards fracture, wear out sooner than those with a larger number of teeth. Figs. 19 and 20 show how the safe load per inch of pitch and per inch of face increase with the number of teeth n .

Fig. 19 is constructed on the basis of $C = 125,000$ lb. per square inch and $S = 16,000$ lb. per square inch, the allowable stresses for spur gears when inclosed in an oil-tight housing. The further we go in our diagram above the curve W_b , the less the factor of safety from the standpoint of bending stresses; the further we go below that curve the greater the danger from the standpoint of compressive stresses. Each line representing the capacity W_c which corresponds to a given ratio a intersects the curve W_b in a different point; in other words, for the same maximum stress, each gear reduction a requires a different number of teeth n .

For economy in manufacture, the number of teeth in the gears must not exceed a certain maximum, which is given by the point where the curve W_b intersects the line W_c corresponding to that particular ratio. Otherwise the circular pitch is reduced and the bending stresses exceed the set limit. And, vice versa, for economy in the manufacture of gears calculated on the basis of bending stresses, the number of teeth must not drop below a certain minimum given by the intersection of the curves; otherwise the diameter is reduced and the compressive stresses will

TABLE IV
Number of Teeth at Different Ratio A , Compressive Stress C Being Constant

a	n	N	a	n	N	a	n	N
.154	12	78	.63	17	27	1	21	21
.25	13	52	.72	18	25
.35	14	40	.825	19	23
.442	15	34	.91	20	22

be above those desired. Consequently, when the stresses C and S are given and we want to use the material to the best advantage, there is a certain number of teeth which must be selected for a given gear reduction $(1+a)$. This we obtain easily by placing W_b equal to W_c . Hence:

In other words, if a smaller number of teeth is desired than that obtained with given values of C and S , either the value of C must be increased or that of S decreased. Further, whenever gears have too small a number of teeth, excessive wear must be expected.

For our cases we get special equations:

$$\begin{aligned} \text{(a)} \quad C &= 125,000, S = 16,000, \\ 1+a &= \frac{7.8n}{1000y} \dots \dots \dots (22) \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad C &= 90,000, S = 13,000, \\ 1+a &= \frac{5n}{1000y} \dots \dots \dots (23) \end{aligned}$$

$$(c) \quad C = 110,000, S = 14,000,$$

$$\sqrt{1+a^2} = \frac{6.9n}{1000y} \dots \dots \dots (24)$$

(for bevel gears).

The ratio of C/S is 900,000 to 1,000,000 for spur gears, 800,000 to 900,000 for bevel gears and 600,000 to 700,000 for internal gears.

Example 2. What should be the number of teeth

(a) for spur gears when $C = 125,000$, $S = 16,000$, ratio = 1:4,

(b) for internal gears when $C = 90,000$, $S = 13,000$, ratio = 1:4,

(c) for miter bevel gears when $C = 110,000$, $S = 14,000$?
Solution:

(a) From curve A in Fig. 22 we find that the proper number of pinion teeth n for the case where $1+a = 0.25$ is 14.

(b) From curve B we find that for a ratio $a = -0.25$, $n = 12$.

(c) For miter gears we must use equation (24). For $a = 1$ we get

$$\sqrt{2} = 6.9 \frac{n}{y'}$$

This equation can be solved by the trial method; if we take $n = 24$, we find that

$$n' = 24 \sqrt{1+a^2} = \frac{24}{\cos 45^\circ} = 34,$$

then

$$y' = 0.118$$

and

$$\sqrt{1+a^2} = 1.405,$$

which is only a slight error for the required gear ratio. Hence, 24 teeth for each bevel gear is a proper number if the stresses C and S are to be in the right proportion. It is better, however, to use unequal numbers of teeth, making the driving bevel with 23, for instance, and the driven one with 25 or 24 teeth. In this way the action of the teeth will remain uniform longer and the life of the gears will be prolonged. If helical teeth are used, their number can be made a little lower, say $n = 21$, and both gears can be made of the same diameter to facilitate production. Even here, though, the action is more uniform with different numbers of teeth.

Strength of Helical Spur Gears

One of the objectionable features of helical spur gears is the end thrust produced when the gears are in action. When helical gears are transmitting motion between two

TABLE V

Ratios Used by Author in Double Reduction Transmissions

Speed	Total Ratio	Engine R.P.M.	Rear Wheels R.P.M.	Miles P. H.
Direct—High	1:5.76	1400	243	29
Direct—Low	1:13	1400	106	12.6
Low—High	1:30	1400	47	5.6
Low—Low	1:67.8	1400	20	2.0
Reverse—High	1:26.8	1400	52	6.2
Reverse—Low	1:60.8	1400	23	2.3

parallel shafts this end thrust can be avoided by placing two helices of opposite hand side by side, a form of gearing that has become known as "herringbone gears." The advantages of helical gears in general and of herringbone gears in particular can be summarized as follows:

(a) The action is continuous and smooth; there are no shocks from transference from tooth to tooth, hence the pitch can be made finer than with straight teeth.

(b) The teeth do not wear out of shape; the bending action of the load on the teeth is less than with straight gearing and does not fluctuate.

(c) The gears work silently and without vibration.

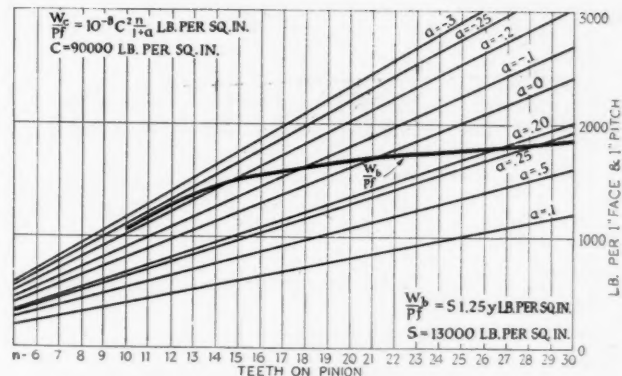


Fig. 20—Variation of safe load per inch of face per inch of pitch with number of teeth and gear ratio for different stresses than in Fig. 19

(d) The friction losses are reduced. Therefore, herringbone gears can be used for higher ratios and greater velocities than any other kind.

A herringbone gear tooth very seldom breaks off, because these gears are capable of transmitting from ten to twenty times the working load without fracture. This makes it plain that a calculation on the basis of breaking or shearing stresses gives little indication whether the gears are going to last or not.

As to the helix angle, there are good reasons why a moderate angle is to be preferred. In all helical gears the pressure acts in a direction normal to the teeth, and is the resultant of the tangential and axial pressures. The normal pressure becomes greater in proportion to the useful driving pressure as the helix angle is increased, while the available normal tooth section becomes less. Further, when the helix angle is considerably steeper than the angle of repose for the material in contact, there is a tendency for the teeth to bind with a wedge action. Herringbone gears with abnormally steep helix angles show loss of efficiency and increased wear from this cause.

In reference to the strength of helical spur gears the teeth need not have the same breaking strength as with straight spur gears, because they do not have to withstand the heavy and indeterminate stresses which arise from inequalities of angular velocity. The main thing is to provide against wear. By using a finer pitch, leaving the diameter the same, each tooth has its wearing surface reduced, but this is more than compensated for by the larger number of teeth simultaneously in contact. In high ratio gears, using pinions of exceptionally small diameters, the pitch is finer than for ordinary ratios, but the face width is extended to give the proper wearing surface.

An important factor in determining the proportions of teeth is the relation between the pitch line velocity and the maximum permissible specific tooth pressure. In present practice, the results of experience in the matter of safe working load under given conditions have been reduced to a relationship between pitch line velocity and shearing stress on the pitch line thickness of an imaginary straight tooth, assuming only one tooth in engagement at a time. The shearing stress is usually assumed to be an approximate measure of the specific tooth pressure and the relationship referred to affords a convenient means of arriving at approximate necessary dimensions.

Curve K in Fig. 13 and Table III give values of shearing stress in pounds per square inch on the pitch line section of an imaginary single tooth for corresponding pitch line velocities V in feet per minute. These values are entirely empirical, but are based on the results of practical experience.

The circular thickness of the gear tooth at the pitch line can be found by multiplying the circular pitch by 0.40 for gears with short addendum of 0.3 of its working depth

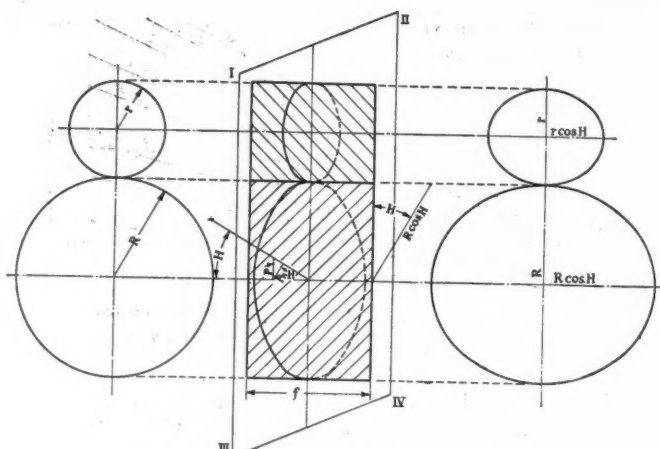


Fig. 21—Section through helical gears

and a 20 deg. pressure angle. Then the section area of the single tooth at the pitch line equals $0.4 p_n f / \cos H$, where the normal pitch $p_n = p \cos H$ and the allowable tangential force at the pitch line

$$\frac{W}{\cos H} = 0.4 K p \frac{\cos H f}{\cos H} \text{ lb.,}$$

where K = shearing stress factor in pounds per square inch. Finally,

$$W = 0.4 \cos H K p f \text{ lb.} \dots \dots \dots (25)$$

(for herringbone gears).

As the herringbone gears usually have a standard angle of helix of 23 deg., $\cos H$ is almost equal to 1. Therefore, it is left out in the above equation and included in constant K . The formula then reads

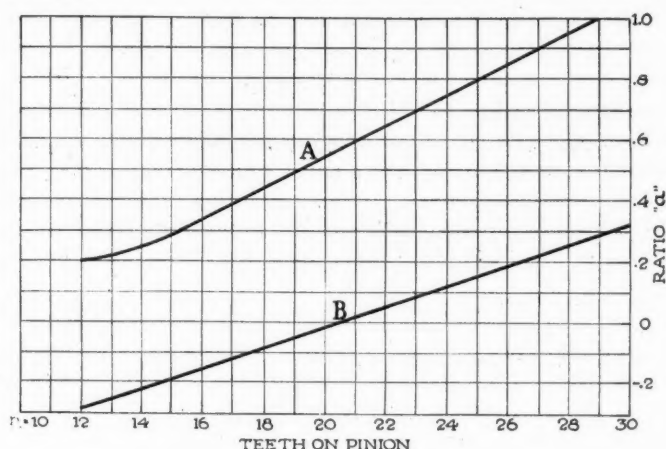
$$W = 0.4 p f K.$$

Table III gives safe shearing stresses K in pounds per square inch for herringbone gears as found in standard text books on gearing.

By the compressive stress method we can, however, find an accurate equation for determining helical spur gear dimensions. In Fig. 21 let us pass a plane I, II, III, IV through a pair of helical gears perpendicular to the direction of the tooth which is in contact at the moment. The sections through both gears will be ellipses in contact along their minor axes, with major axes $r/\cos H$ and $R/\cos H$ and minor axes r and R .

It is known from calculus that the radius of curvature of an ellipse at the end of the short axis is (major axis)²/minor axis, or

$$\frac{r^2}{\cos^2 H} : r \text{ and } \frac{R^2}{\cos^2 H} : R.$$



$$1 + a = \frac{10^{-8} C^2 n}{1.25 S y}$$

Curve A — $C = 125,000$, $S = 16,000$

Curve B — $C = 90,000$, $S = 13,000$

Fig. 22

That is, the radius of curvature for the pinion is $r/\cos^2 H$ and the radius of curvature for the gear $R/\cos^2 H$.

We can now insert all necessary dimensions in equation (5):

$$\frac{W_c}{\cos H} = \frac{C^2}{16.3 \times 10^8} \frac{f r}{\cos H \cos^2 H} \frac{r}{1 + \frac{r}{R}}$$

and

$$W_c = \frac{C^2}{16.3 \times 10^8} \frac{f r}{\left(1 + \frac{r}{R}\right) \cos^2 H} \dots \dots \dots (26)$$

Further,

$$2 \pi r = n p.$$

We then get:

$$W_c = 10^{-8} C^2 p f \frac{n}{(1 + a) \cos^2 H} \dots \dots \dots (27)$$

(for helical spur gears),

where p is not the normal but the circumferential pitch. Herringbone gears being in most cases used for high reductions we can omit the factor a and obtain:

$$W_c = 10^{-8} C^2 p f \frac{n}{\cos^2 H} \dots \dots \dots (28)$$

(for helical spur gears with large reductions).

Comparing equations (2) and (27), we can see plainly that the shearing stress K in equation (2) is only an approximate and comparatively poor measure of the compression on the tooth surfaces.

Materials for Automobile Engines

ACCORDING to communications in German business papers, the following are specifications of materials used in German automobile engines:

Cast iron for cylinders and pistons—

Silicon	1.7 %
Phosphorus	0.4 0.5 %
Sulphur	0.07 %
Manganese	0.6 %
Graphite	2.6 %
Total Carbon	3 %
Combined Carbon	0.65 %

Cast iron for piston rings—

Carbon	2.6 %
Graphite	2.0 %
Combined Carbon	0.63 %
Manganese	1.3 %
Silicon	2.7 %
Sulphur	0.12 %
Phosphorus	0.1 %

Cast aluminum for crankcases—

Copper	6 %
Nickel	2 %
Silicon	0.01 %
Zinc	8 %

Remainder—Aluminum.

Truck Axles

IT was stated in the Aug. 25 issue of AUTOMOTIVE INDUSTRIES that Timken axles were used on the two-ton models of the Independent Motor Co. This statement was incorrect. Axles made by the Wisconsin Parts Co. are used.

Various Possibilities in Airplane Flying Controls

Means have been devised for relieving the pilot from judgment in the necessary movements of control mechanism, the purpose being to increase safety. Among the methods used are a pendulum connected to control levers, certain aerofoil arrangement, aerodynamic balancing mechanisms, servo motors, and gyroscopes. These devices are appraised here.

SINCE the first stages of development of the art of flying, inventors have been seeking an "open sesame" to automatic control. It has been considered that if some means could be devised to relieve the pilot from exercising judgment as to necessary movements of the control mechanism, possibility of accident would be removed and immediate advance in the art assured.

One method forwarded long ago, and periodically re-occurring in various forms, is through the use of a pendulum connected to the control levers. It is found, however, that the pendulum weights are as much subject to inertia forces as to gravity forces, and that the corrective gravity components are wiped out by the undesirable inertia components.

Automatic stability through aerofoil arrangement and design is also sought. No great difficulty is found in making an airplane inherently stable. But this is done with a sacrifice of controllability. The inherently stable airplane is "stiff" on the controls, and fights the pilot. A properly designed airplane is inherently stable only to the extent that it does not interfere with change of altitude at the will of the pilot. Extreme inherent stability is no more to be desired than is a motor car steering mechanism that would hold the car to a straight course, and resist every effort to turn.

Balancing Mechanisms

Aerodynamic balancing mechanisms have also been designed, constructed and tried out. The net result, ordinarily, has been only "a long journey for a small load." One particular device of this type has attempted to secure lateral stability through aileron action from vertical fin forces. Vertical fins at each upper wing tip, hinged at the base, are lever connected to the ailerons. Pressure on the vertical surfaces from a side slip or skid actuate the ailerons to correct the side slipping or skidding attitude. It is a nice problem to secure properly proportioned parts, and over or under control is the tendency. Possibilities as an auxiliary to manual control are present, but it would appear that the same result could be secured by balances directly connected to the control surfaces.

Servo Motors

Servo motors, similar to the power steering mechanism on steamships, are used on the larger airplanes to assist the pilot in moving the control surfaces. Commonly these comprise a series of clutches, or friction disks, driven by a wind motor, shifted through the action of the control cable to act in conjunction with the control column or wheel. The movement of the surfaces is at all times in the hands of the pilot as far as amplitude and speed of motion are concerned, the servo motor doing the actual work of displacement.

The servo motor principle is excellent, and merits further development. Those servo devices available to date are open to criticism of mechanical design, reliability, service life, and adaptability to ready incorporation in the design.

Gyroscope Control

Airplane control through gyroscopes and electric motors has been tried out with some success. On straight away flying, a control of this type relieves the pilot of all duty except supervision. However, on landing, the gyroscope control is thrown out, as its sole function is to keep the plane in balanced horizontal flight and to resist any change in altitude whether desired or not.

The gyroscope control is of necessity complicated, comparatively heavy, and subject to failures. It can, and doubtless will be developed and refined, as it meets the requirements of large planes on long flights.

The most common method of securing ease of control is to balance the control surfaces themselves, so that little effort is required to displace them. Several types of counter balance are in use. One is a double cambered extension of the control surface tip, reaching forward of the hinges. Another, the auxiliary balance type, comprises a small surface held away from and forward of the control surface proper, and rigidly connected to it. Both types are in common use, and if properly designed, simple, effective and efficient.

To sum up, no one invention, device or design is going to meet all operating conditions. On small planes—up to 70 ft. span—a reasonable amount of stability and an intelligent proportioning of the control surfaces will provide satisfactory air qualities. Balanced control surfaces here are a refinement rather than a necessity, as the effort required to move the surfaces is relatively small. On the larger planes, balanced control surfaces are essential. Inter-connection of the aileron leads is advisable, so that the loads carried by the pilot's controls are only those of displacement.

Aerodynamic controls that remove all connection between the pilot and the control surfaces are hazardous. Servo motors are an aid and merit further development. The gyroscopic control will prove advantageous in large air cruisers to come. The problem of flying controls cannot be solved once and for all for all planes, but refinement of original designs based on common laws, together with attendant development of control accessories, will render flying more certain and less hazardous.

The greater the development along these lines, the more rapid is the commercial growth of flying likely to be. Such development already has been going forward to a considerable extent.

A New Machine for Use in Sinking Large Dies

Is especially adapted for machining the surface of dies used in the manufacture of pressed body panels, cowls, fenders and the like, the tool being guided by a "master" which may be of soft material.

IN the manufacture of modern sheet metal automobile bodies use is made of very large dies for forming the panels, doors, cowls, fenders, etc. These dies, which are made of cast iron or steel, involve a very heavy expense and, besides, the time in which they can be produced by the methods which have been in use is long and rather uncertain. The surfaces of a body must be without perceptible inaccuracies, and if a slight mistake is made in the die sinking operation it is often necessary to rework the entire surface of the die. In making these dies it has been necessary to take them from one machine to another, and great demands are made on the skill of the operator. After the machine operations are finished the fitting still involves lengthy and laborious hand operations.

A special machine for cutting or sinking dies for large parts of the character mentioned has been developed by the Keller Mechanical Engraving Co. This firm has been making die sinking machines for a good many years, but until recently there was little possibility of applying these machines to the production of such dies as are used in the manufacture of metal bodies, due to the fact that the operation of their machines depended on a principle which made the pressure of the tracer passing over the "master" or model equal to the pressure of the cutting tool on the block. This made the use of masters or models of soft material impossible. The models for body parts are usually made of wood, and as these could not be used directly in the die sinking machine, a number of rather expensive intermediary processes would have been necessary, thus rendering the process impractical.

This difficulty has been overcome in the new machine by the use of electric control. In this machine the pressure of the tracer on the model is entirely independent of the pressure of the tool on the work. The machine operates on the milling principle, the tools used being combination face and end mills. The master and the work are clamped to the stationary table of the machine, the former above the latter; a tracer controlling a number of electric contacts passes either horizontally or vertically over the model. Both the tracer and the cutter are capable of motion in three planes at right angles to each other; in other words, they have feeds in three directions. When the travel or stroke of the cutter in its work is normally in a horizontal line, parallel to one of the main planes of the master or work, the regular feed of the cutter head, after each cut or stroke, is in a vertical direction, and vice versa. Finally, there is what may be called the "in and out" motion, which, compounded with the stroke or travel of the tool head, gives to the cutter a motion corresponding to the line formed by a section of the master surface at the level of the tracer. Feed and travel controls are interconnected and each of the two may be made either vertical or horizontal. All of these motions are on heavy

slides and are effected by means of lead screws driven by electric motors. The feed is automatic in both the vertical and the horizontal plane. Quick return motions are provided for both the transverse and "in and out" directions.

There are several electric motors which are mounted directly on the machine with practically all wiring fully inclosed. Of these the cutter drive motor is of 2 hp. and the feed motor of $\frac{3}{4}$ hp. The circuits of the motors are controlled by a series of push-button switches arranged on a switchboard in a location convenient for the operator.

In the manufacture of such sheet metal parts as here referred to it is, of course, necessary to have both a punch and a die or a male and a female die. If the punch is produced directly from the model the die can be made from a plaster or cement cast taken from the model, or, better still, this cast can be made from the punch after it is finished. Allowance for the thickness of metal to be formed can even be made in the die by covering the model with a layer of sheet wax of the required thickness.

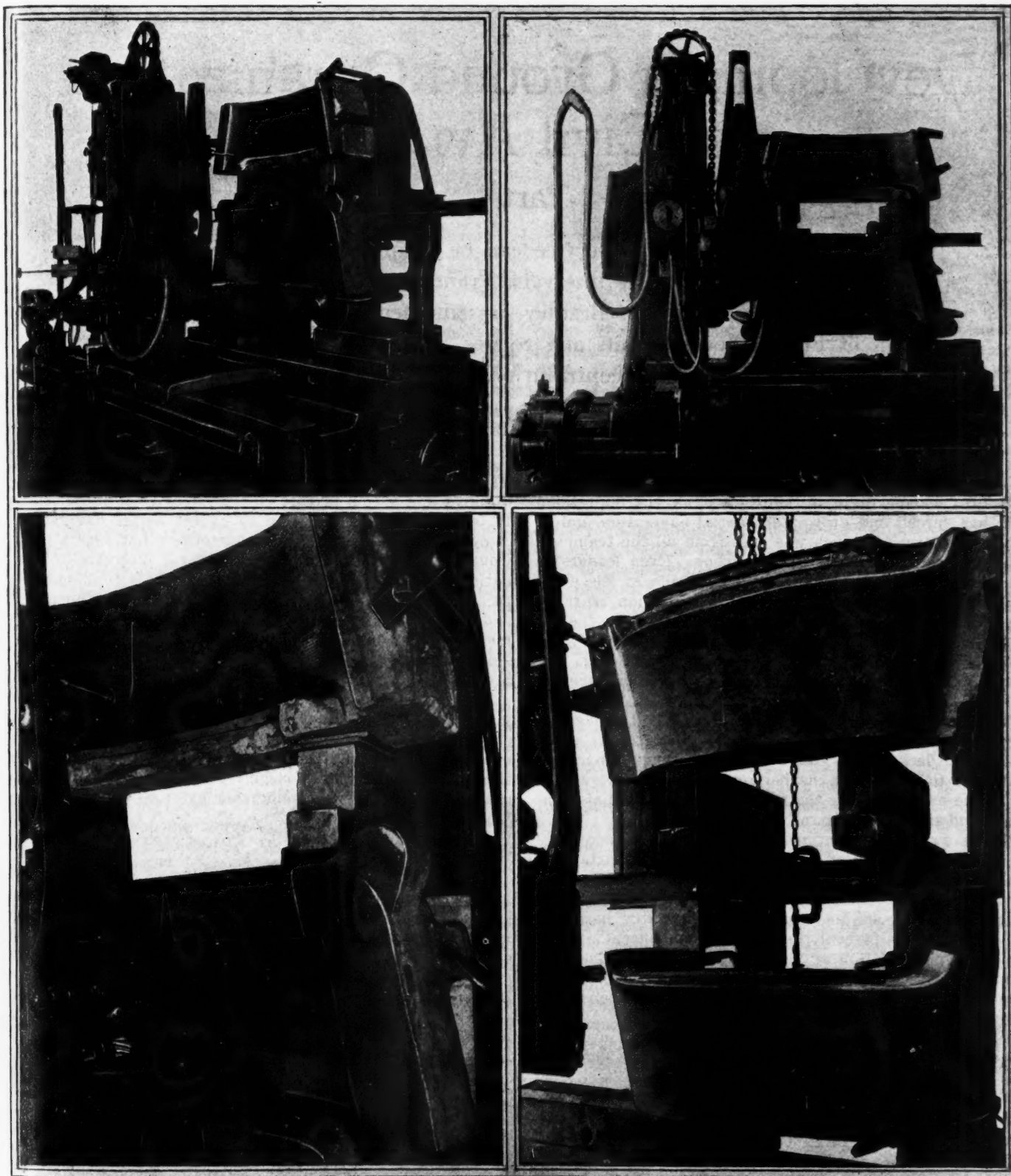
The machine here illustrated can cover die surfaces up to 72 x 48 in., and even this is not its limit, as in the case of larger die surface, after part of the die has been completed the whole machine can be moved transversely on its bed and the rest of the surface finished.

The worktable of the machine is stationary and is provided with T slots for mounting the master and the work. The transverse feed of the spindle head can be varied from 2 to 12 in. per minute by means of rheostatic motor control and change gearing. The vertical travel is at the rate of 6 in. per minute. The feed per stroke can be made anything from 0.030 to 0.250 in. The spindle can be driven at from 60 to 420 r.p.m. and is arranged to take a taper shank (No. 12 B. & S.) capable of carrying end mills up to 5 in. diameter.

The spindle head is carried on a sliding column and is counterbalanced. This, as well as other moving parts, has a large bearing surface and is provided with taper gibs. The spindle is driven from a separate electric motor through back gearing. Lubrication of the spindle is from two sight-feed oilers which communicate with all bearing surfaces. The cutter is lubricated by means of a gear-driven rotary pump, the surplus oil draining back to a tank in the bed.

It is always advisable to use the coarsest feed consistent with the nature of the job. The raised feed lines are easily ground off and a correct, smooth surface is obtained in a short time.

The illustrations herewith show the machine working on the die and punch for an automobile cowl. In this operation a 2-in. mill is used for the roughing cut and most of the finish cut, and a $\frac{3}{4}$ -in. mill for sections too small for the 2-in. mill. Each piece is completed in 24



Upper left—Keller automatic die-sinking machine at work on a cowl. Upper right—Front view of machine, showing starter box for main spindle motor, method of carrying cables in flexible metal conduit and balancing of cutter head. Lower left—View showing master in cement (above) and die blank of cast iron being worked on (below). The tracer and milling tool can be clearly seen. Lower right—Master and blank for punch for cowl

hours. We are informed that in many places more than $\frac{1}{2}$ in. of stock was removed.

The first machine of this type was installed in the plant of Edward G. Budd & Co., body builders. Machines have also been furnished to the Studebaker and Dodge plants and one for the Ford plant is in the process

of manufacture. The machine should not only greatly cheapen but also expedite the production of dies for body parts.

The machine is equally applicable to large forging dies. Obviously it has advantages for dies for crankshafts, camshafts, axles, etc.

Developing a Ground Organization for Civil Aviation

Part I

No reliable commercial air service can be maintained without suitable landing grounds at regular intervals. France has developed an excellent ground organization. Mr. Bradley presents here an analytical description of French developments and relates them directly to American problems. An important contribution to civil aviation development.

By W. F. Bradley

SINCE the day when the Wright brothers made their first soaring flight in South Carolina, the impression has spread and grown that aerial navigation, unlike any other form of travel, was free from all the trammels of route and road, of port and harbor. Even leaders in the aeronautical movement have been guilty of the error and have been responsible for the organization of trials and competitions intended to improve the speed, the reliability and the endurance of machines at a time when their efforts ought to have been directed towards the creation of conditions under which planes could operate with the highest degree of safety.

The greatest obstacle at the present time to the development of commercial aviation is the absence of aerial roads—the lack of the entire ground organization corresponding to the docks, harbors and explored waters of maritime navigation, or the permanent ways, signals, stations, and sidings of our railways.

There was a time not many years ago in the history of the American nation when it was more important to make roads than to develop automobiles. The nation realized that and gave its support to the good roads movements with such enthusiasm that the industry has been able to attain its present prodigious importance.

Commercial aviation at the present time needs land organization, the creation of chains of landing grounds, weather report stations, gasoline depots, repair shops, etc., without which real development is impossible.

Until such a service has been established all over the country there can be no healthy development of commer-

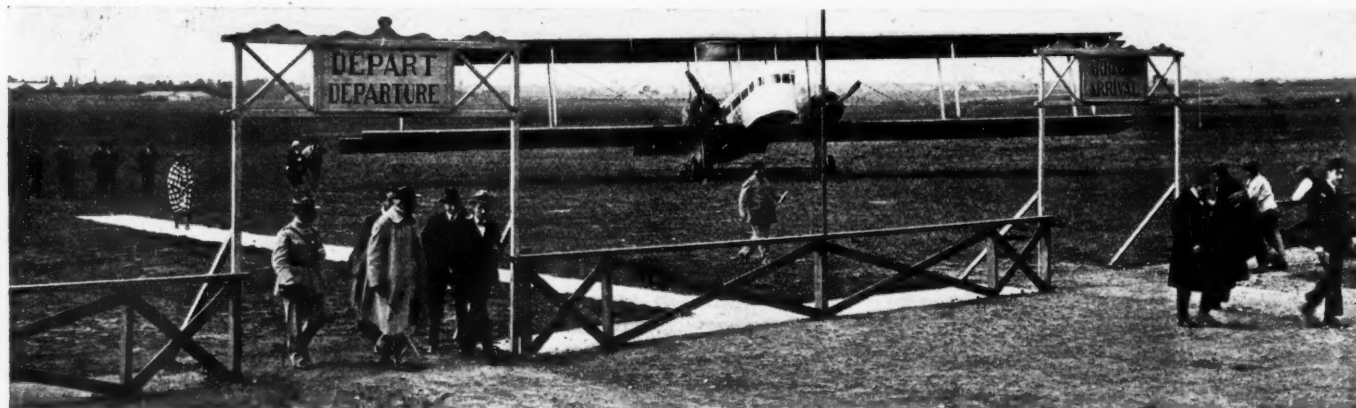
cial aviation. This duty devolves on the national Government and not on private enterprise or local authorities. It is not only unreasonable to expect aerial navigation companies to create ground organizations, but such a plan would be as detrimental to the general interests of the nation as the old system of toll roads. This fundamental fact has been realized by the French aviation authorities, and as a consequence the Government has set itself the task of laying out aerial roads which must be free for all—in distinction to aerial lines which would remain the property of certain vested interests.

The importance of France in connection with this program lies in the fact that her territory constitutes the cross roads of Europe. This special geographical and commercial situation of France has been fully appreciated by the Government and has largely influenced them in their plans for developing commercial aviation within their frontiers.

Opening Aerial Lines

Whenever there is interest in opening up two points by aerial communication, the French Service de la Navigation Aérienne undertakes the whole of the ground service, leaving the actual operation of the planes in the hands of aerial navigation companies. In other words, the Government builds the aerial roads, and private companies or individuals use them.

No reliable and regular commercial air service can be maintained unless the entire line of flight is marked out by landing grounds at intervals of sixty miles. In coun-



Arrival of Farman twin motor plane at Bourget, near Paris, coming from London



Belgian and French planes used on international service



Farman twin engine Goliath used on Paris-London service

tries where much fog prevails, such as northern France and practically the whole of England, this distance must be decreased to thirty miles. The foundation of commercial aviation is economy of time and safety. This implies regularity, for so long as there is a doubt regarding the possibility of a plane reaching its destination there can be no real economy of time. The attempt has been made in Europe and elsewhere to run regular services without a string of landing grounds, with the result that planes would frequently start out on time, get within a few miles of their destination and then by reason of fog or other weather conditions be obliged to swing round and return to their starting ground. Had intermediate grounds been available, the planes could have landed there and either have waited for an improvement in weather conditions or have transferred the passengers to automobile or train.

While these landing grounds must be frequent, they need not necessarily be elaborate. In very many cases the pilot does not even need protection against the weather, for his machine is capable of being parked out in the open. He must be assured, however, of a prepared ground on which he can land with safety, of a supply of gasoline, a telephone, and weather reports.

Types of Landing Fields

Under the scheme worked out in France, and which is being gradually applied to the whole of that country and will be extended to other European countries, five different types of landing grounds are provided for. They begin with a very simple form of emergency landing ground, in charge of a guardian—usually a man and his wife, who live in a cottage on the field—a supply of gasoline, a selection of tools, a telephone to the nearest town, and weather bureau reports. These emergency landing grounds should measure about 500 by 500 yards, or have an area of ten acres, and while being on the direct line of flight, they should, if possible, be by the side of a main road, so as to assure ease of access and if possible be near a town or village.

Although the French Government idea is that all landing grounds from the simplest to the largest, intended to be used by passenger or freight carrying planes, should be owned and controlled by the State, experience in other quarters has shown that economy can be effected and very good results obtained by renting land for emergency landings. This is particularly applicable when traffic is light. An emergency landing ground may not be required more than once a year, but when it is needed it is needed urgently. It is therefore possible to get an option on land which can remain under cultivation, but which at the same time will always be kept in such a condition that planes can land on it with perfect safety.

Ignoring the emergency ground, four types of aerial stations are provided under the European scheme. These begin with a third class station, followed by a second class,

a first class station, and most important of all, an aerial port. The plan of the French Aerial Navigation Service provides for correlation between each of these, so that as traffic increases, or the necessity makes itself felt, each type of landing ground can be developed into a higher class without any buildings having to be torn down or any rearrangement of the general plan.

The area of the ground must not be less than fourteen acres, this being on the supposition that the approaches are clear, without tall trees, high buildings, or high tension electric wires. Although long-distance planes will not usually make landings at these intermediate stations, the grounds should be laid out so as to give adequate protection to planes obliged to make a landing, and also have the necessary facilities to be used as regular stopping places. Even the third rate station should have one permanent shed not less than 110 by 100 ft., a workshop fitted up for metal and wood working, forge, stores, and automobile garage. There should be two trucks on the ground, one of 1½ and the other of 3-ton capacity.

In addition to the caretaker, who will live on the ground, there should be a ground manager, preferably an aviator; a weather bureau should be established, and a wireless telegraphy station installed. In laying out a third-class station additional ground should be secured to enable more sheds to be erected, as required. The single shed is intended for planes which have to make a forced landing, or for the planes running on a regular schedule, but only making short stops on the ground.

Second-Class and First-Class Stations

The second-class station, under the French scheme, is an enlargement of the third-class post, with more sheds, better mechanical facilities and a bigger supply of gasoline, oil and spares. A first-class station, while on the same general lines as the smaller ones, calls for an elaborate equipment. It should have at least two permanent sheds, a long-distance wireless installation, well-equipped machine shop, gasoline, oil and spare parts, central offices, customs office if near the frontier, a station master's office, a complete weather bureau, and as many private sheds as are required for local flights. The aerial port is the most important of all, for it is generally the terminus of international lines and the scene of much local flying.

At the present time there is only one aerial route in the world laid out approximately on the lines indicated above. This is the line from Paris to London. No pilot can fly in Europe unless he possesses a Government license and unless his physical condition is found satisfactory at half yearly medical examinations. For this service there is a special medical department at Le Bourget with the necessary instruments for testing eyes, heart, nerves, pulse, etc. Weather reports are prepared by the French Government Meteorological Department and are received and despatched from all stations along the route seven times a day.

Few figures exist on the cost of construction and operation of aerial routes, for few such routes exist. The only really reliable data in existence is that in connection with the Paris-London route, where, on the basis of a big terminus at each end of the line, and landing grounds at intervals of thirty miles over the entire route, the cost of construction is 20,000 francs per kilometer, or at nominal rate of exchange, \$2,300 per mile. In arriving at this figure the whole of the cost of the Bourget air port is included, whereas it would be reasonable to only charge one-third to this line, for this port is also the terminus of the Brussels and Warsaw lines.

Building an aerial route is very much cheaper than building a highway, for using the French figures as a comparison, a twenty-three-foot first-class highway costs 200,000 francs per kilometer (\$23,000 per mile) to build, and has to be remade every ten years. The maintenance of an aerial route of this nature is 2,000 francs per kilometer (\$230 per mile) per annum. Unlike a highway or a railroad, the cost of the aerial way does not increase in proportion to the increase in traffic, for there is no limit to the width of the road, and overhead charges decrease enormously as traffic volume increases.

It is the practice of the French Government department to purchase land outright when building an aerial route. This is more costly than would be the case in the United States, for land is considerably divided, and in order to get suitable ground a vast number of holders have to be dealt with. It generally happens that one or more in the group refuses to accept the Government offer, and before the obstreperous individual can be made to yield legal proceedings have to be undertaken, with consequent delay and expense.

Government Revenue from Aerial Traffic

An important income may be expected from an aerial route carrying intensive traffic. This will principally be obtained from port dues paid by the companies running regular home and foreign services, and by casual tourists. In France the fee for landing on a State ground is one cent per horsepower, with an additional fee of 20 cents if the machine is fitted with wireless. The pilot is entitled to assistance from the ground hands in bringing in his plane, starting the motor, bringing water, oil, and gasoline, etc. For starting or landing at night an additional fee of \$4 is charged for lighting the ground.

For the use of a shed the price varies according to whether the machine is a casual tourist or a regular liner. For the former the use of a shed for twenty-four hours costs 2 cents per square meter, this area being obtained by multiplying the wing spread by the length of the machine. For touring or privately-owned planes sheds can be rented for periods of three months at a cost of slightly less than 1 cent per day per square meter of surface, this including light and caretakers. Special arrangements are made for regular liners, the owners of which require sheds only and maintain their own staff.

On the important landing grounds repairs can be carried out by the ground staff, the rates being 70 cents an hour (nominal exchange) for skilled labor and 50 cents an hour for unskilled labor. Material is charged at cost price and the total amount increased 25 per cent for overhead. For the use of a tractor the charge is 35 cents a kilometer, and for a five-ton truck 70 cents a kilometer. For a passenger car the charge varies from 20 to 30 cents a kilometer, according to the size of the automobile.

An adequate weather report service must be organized in conjunction with every established aerial route. Under the system of State owned landing grounds, as it exists in France, the Government Weather Bureau organization is made use of and reports sent to every station along the

line of flight. On the Paris-London line, for instance, which is subject to much fog, it is most important that the pilot should know, before starting out, what kind of weather he will find over the sea, and whether landing conditions will be suitable at the end of the trip. It is quite possible to make a start under bad weather conditions if the pilot has the information that he will run into clear atmosphere within a few minutes, or if he is sure that he can pick up his bearings on the coast and that his terminus point is not hidden in fog.

There is no complete wireless telegraphy service in operation on any aerial line. On the Paris-London route wireless ground installations exist, and weather reports are received by these, but wireless between ground and plane has not yet been completed. This problem is receiving close attention, and it is expected that before the end of the present year all the regular passenger-carrying planes on the Paris-London route will have wireless, enabling them to keep in touch with their terminus point during the 2½ hours they are in flight. It is recognized that a good wireless system is essential to any properly organized line.

Night Landings

Night flying still remains one of the problems of the future, for such trips can only be carried out with safety on a perfectly organized aerial route, with landing grounds every thirty miles, every one of which is fitted not only with a light house, but with an installation for flood lighting. Flood lighting sets, such as were used during the war, are now in service at the big aerial stations, but there is no chain of lights across country necessary to guide the pilot to his destination. At the present time such installations as exist are in the nature of a makeshift to assist pilots who for any reason whatsoever are out after sunset. Eventually it is intended to light the entire Paris-London route, but for the present flash lights exist only at the Bourget and Croydon termini and the frontier station at St. Inglevert, and have a visibility of twenty-five miles. Merely to show the pilot his route suitable lights on the railroad stations would be sufficient, but if the service is going to be carried out with the same degree of safety as during the day it is essential that every emergency landing ground should be equipped for flood lighting, and that this should be ready to be switched on whenever a pilot signalled from the air that he was under the necessity of coming down. At the present time no such organization exists.

War experience has shown that night landings can be made with a high degree of safety by the use of fuses dropped with a parachute, but the cost of these is so high that no planes carry them even for emergency purposes. Electric generating sets on the plane have not given any great amount of satisfaction, for if employed without batteries they give the least light when it is most needed, and the use of batteries constitutes an extra load from which very little extra service is obtained. For signalling purposes an isolated light is of much more value than a more powerful light in the center of a city. As an instance, the flash light on the top of the Eiffel Tower, nearly 1000 feet above the ground, is not so readily picked up as less powerful lights placed on aerodromes well outside the city.

License Methods

No plane can be flown in France unless it has received a navigability certificate after having been technically examined and approved, and unless it is officially registered and carries its registration numbers and letters on the wings and fuselage, as provided by law. No pilot can fly unless he has his official license and has passed a medical

examination. For public services, carrying passengers and freight, the control is really severe and corresponds, in a general way for both machines and crew, to that in force for ocean-going vessels.

In establishing the French airplane license, the procedure adopted is similar to that for automobiles. All new types have to be examined by a Government technical department before they can be put into service, but all subsequent machines of the same type are given a navigability card on proof being shown that they conform in every respect to the original model. The registration certificate certifies the nationality of the machine, whether it is privately owned or in public service, the name and address of its owner, and the identification marks it must carry.

Only war planes can carry the military marking consisting of red, white and blue circles. Commercial machines are in two classes: those used in public service for passengers and freight, and those used privately by their owners. The first one of the series of letters painted on the wings and fuselage indicates the nationality. These letters have been determined by international agreement, and are, among others, F for France, G for Great Britain, O for Belgium, etc. A heavy black line under the identification marks shows that a plane is on private service. A registration card corresponding to the numbers carried must be aboard at all times. These regulations do not apply to experimental machines, which, however, must be kept within a radius of three miles of their factory or flying ground.

In addition to its registration certificate, every plane must carry a navigability license, which really corresponds to a ship log book, and if on public service this must be filled up with particulars of every trip made and an account of all repairs and work done on the plane and the engine, thus giving the aviation authorities a complete history of every plane used for passenger service.

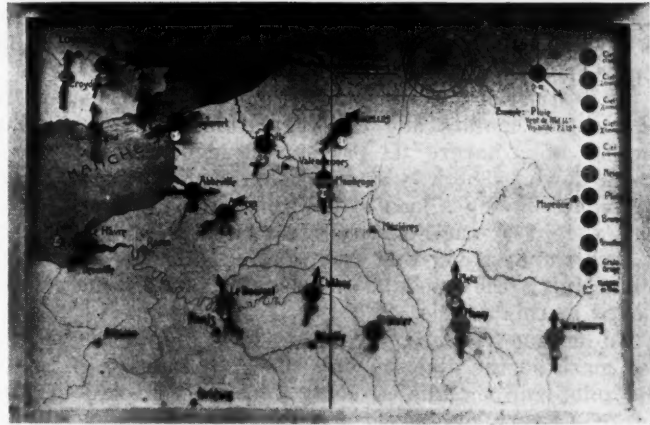
Every pilot on a public service plane must possess a license, which is only issued after a practical examination, and a log book containing a record of his medical examination, all flights undertaken, accidents, etc. The license is only given for a period of six months, at the end of which time the pilot must undergo another medical examination. The pilot's log book is also renewable every six months, and unless the holder has accomplished a minimum of ten hours' flying in this period he must undergo another practical examination.

Commercial Status

There is not a single aviation service in Europe at the present time which is on a paying basis from its commercial receipts, and it is only by reason of State subsidies that European lines are being kept in operation. It is by means of this subsidy system that the Government is able to keep a close control on the aerial navigation companies and to insist on the regularity of operation and the adoption of precautionary measures which will reduce accidents to the lowest possible figure, and so gain the confidence of the public.

The slogan of the Aerial Navigation Service is "Safety First," and anything which savors of stunt flying or recklessness is rigorously suppressed. Stunt flying is looked upon with a particularly evil eye.

It is the duty of the State to insist on the highest degree of safety in planes and engines, and here again the subsidy system is of value, for it enables the Government to maintain a more rigorous control than would be possible in any other way. Every plane must carry three log books, which must remain aboard, must be filled up every day, and which must be shown to the aviation authorities whenever requested. These books are the route log, the



View of weather report boards at Le Bourget aerial point

plane log and the engine log. The route log contains a record of every trip made, with indication of the number of passengers or load carried, the length of ground test of the engines before starting, maximum number of revolutions of the engines on the ground and in the air, quantity of gasoline and oil carried, any incidents which happen en route, observations of the pilot, wireless messages received or transmitted, the route followed, direction and force of the wind, drift, speed, altitude, and general atmospheric conditions.

Standards of Safety

The plane log contains, in addition to a complete description of the airplane, a record of the initial tests before going into service with horizontal speed at various altitudes, climbing ability, horsepower, loading, etc. This log also contains the make and numbers of engines and propellers, the date fitted and dismantled, and the number of hours of flight. The records required regarding the plane are date of each trip, number of crew carried, name of pilot, hour of starting and arrival, duration and length of flight in miles, number of passengers carried, weight of freight or mail, and quantity of fuel carried. A detailed account has also to be maintained of all repairs or modifications to the plane and the number of hours' flight between each. For the engine log practically the same information is required, so that with the three books a complete history is available at all times of the life of the plane and its engine or engines.

In the present state of aviation development it is difficult to establish absolutely rigid standards of security, for while on the one hand it is desired to protect the public in the greatest possible measure, on the other hand some room for initiative must be left with manufacturers.

For a public service machine it is stipulated that a plane should be capable of rising with its full load, and without the aid of a head wind, within a length of 330 yards, and land with its engines stopped in a length of 270 ft. Its climbing ability should be 9840 ft. in a maximum of forty-five minutes. Every multi-engine plane must be capable of maintaining horizontal flight at an altitude of 6500 ft. during one hour with a single engine if it has two or three, and with two engines if it is fitted with four. For every plane intended for trips of more than four hours' duration double control must be provided.

One of the French regulations is to the effect that planes making trips of more than four hours' duration or carrying more than four passengers must be fitted with a wireless transmitting and receiving set, carrying at least 180 miles. There is a certain amount of laxity on this point, however, owing to the technical difficulties con-

nected with the installation of wireless on planes. There is the fact, too, that few public service planes make single trips of more than four hours' duration.

No restrictions are placed on the design or construction of airplane motors and the regulations, in general, are merely of a nature to prevent accidental stoppage or break down. There is a stipulation that for public service planes having a load of $2\frac{1}{2}$ tons or more (useful load plus weight of fuel) at least two engines shall be fitted, it being understood that each engine shall be capable of maintaining the machine in the air, as previously mentioned in this article.

An engine revolution counter must be fitted with a red mark on the dial showing the limit number of turns, the pilot and mechanics being forbidden to exceed this figure. Every public service plane must be fitted with double ignition and double distributor and have an ignition cut out for each engine and a separate one operating on the two together. There must be a gasoline shut-off cock for each tank, placed in such a position that it can be operated by the mechanic. A thermometer is stipulated for each engine, so mounted that it will show the temperature of the water at the outlet from the cylinders.

Precautions against fire are a space of at least three-quarters of an inch between the exhaust pipes and all parts of the plane, with the end of the pipe in such a position that it is impossible for the exhaust gases to come in contact with any combustible part of the plane. Carbureter air intake pipes must be brought entirely outside of the fuselage and be fitted with wire gauze screens as a precaution against fire. Provision has to be made for the proper escape of all gasoline overflowing from the carbureter, in whatever position the plane may be flying.

Under the French subsidy scheme every engine must be taken completely out of the plane and entirely overhauled after a maximum of 100 hours' flight. Every plane must

be stripped, examined and re-erected after a maximum of 200 hours' flight. In reality these limits of service are rarely attained. Taking as an example the Farman twin-engine Goliaths used on the Paris-London and Paris-Brussels service, the rule adopted by this firm is that every engine shall be lifted out of the fuselage after a maximum of sixty hours' flight. The engines are then completely pulled down, examined, repaired, re-erected, tested, and put into service again. Although this is the general rule regarding the length of time an engine shall be allowed to remain in service, it is very rarely that an engine remains untouched for this length of time.

The companies running regular airplane services are unanimous in stating that it is impossible, at the present stage of aerial development, to adopt any hard and fast rules for the examination and dismounting of engines. The most reliable companies have preferred the sixty-hour to the official 100-hour limit of the French authorities, but they never assume that because an engine has only done ten hours' flight it is therefore in good condition. With close examination after each trip and a sufficient number of reserve planes regular service can be assured, but the life of an engine is such a variable factor that it is difficult to establish really reliable operating costs.

Main European Airplane Lines in Regular Service

Route	Service	Distance, Miles	Time, Hr.	Cost, Pass.	
				F.	Cost Freight
Paris-London	Daily	233	2½	300	5 f. to 7.50 kilo
Paris-Brussels	Daily	186	2	175	3 to 4 f. kilo
Paris-Amsterdam	Daily	250	3	300	5 to 6.50 kilo
Brussels-London	Daily	186	2	225	5 to 7.50 kilo
Amsterdam-London	Daily	264	3	400	
Paris-Strasbourg	Daily	248	2½	150	2.50 f. kilo
Paris-Prague	Daily	560	6	500	7 f. kilo
Paris-Warsaw	Daily	870	9	800	
Toulouse-Barcelona	Tri-weekly		2½	468	
Toulouse-Alicante	Tri-weekly		6	924	
Toulouse-Malaga	Tri-weekly		9½	1,068	
Toulouse-Rabat	Tri-weekly		12	1,560	
Toulouse-Casablanca	Tri-weekly	1,150	13	1,680	18 f. kilo

Mail is carried on all these lines.

Time - Temperature - Humidity Control for Kilns

AN apparatus for controlling the temperature and humidity of the air passing through dry kilns as used in connection with automobile body-building establishments and aircraft plants has been perfected by the C. J. Tagliabue Mfg. Co. It is based on the principle of the wet and dry bulb. Two thermostatic bulbs are employed, containing a fluid very sensitive to temperature changes. The dry bulb affords the means of keeping the air temperature inside the kiln within the desired limits and is simply influenced by the temperature of the air. The wet bulb is influenced by the rate of evaporation of the water fed to it by a wick.

The drier the air is the more rapid does the evaporation proceed, and a greater amount of heat is therefore ab-

stracted from the wet bulb. This reduces the temperature of the wet bulb in comparison with the temperature of the dry bulb. The opposite, of course, also holds true. It is therefore evident that the temperature of the wet bulb indicates the humidity of the air, and the humidity can be controlled in any desired way by so varying the water supply as to maintain corresponding wet bulb temperatures. The Tag Controller automatically maintains the required air temperature by regulating the heating coils and maintains the desired humidity by regulating the steam sprays. The setting point of the controller is automatically shifted to take care of any desired air temperature and any desired humidity during the desired time period, by means of a cam revolving by clock work.

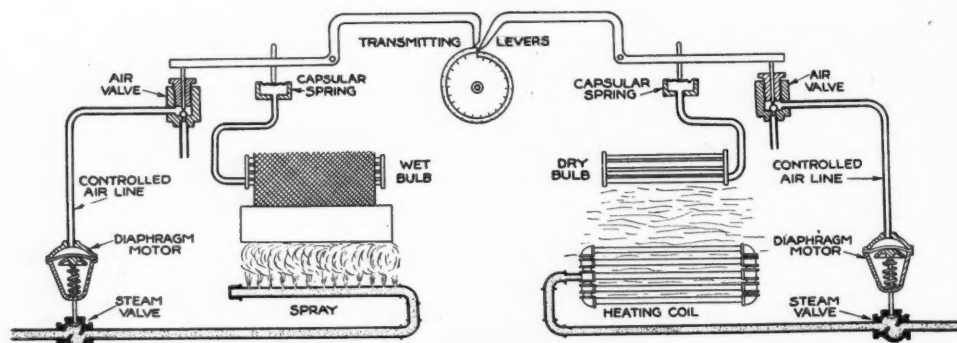


Diagram of Tag Time-Temperature-Humidity control system

TO protect aluminum and its alloys from corrosion by browning the metal electrolytically, the aluminum is suspended in an electrolyte consisting of a sulphur compound of molybdenum with a zinc anode at a temperature of 60 deg. to 65 deg. Cent. The aluminum is soon covered with a dark brown coating, and may be bent or rolled without cracking the coating. Aluminum thus treated was immersed in a salt solution for two months without showing the slightest corrosion.

A Practical Analysis of British India as a Market for American Motor Vehicles

Part II

Much detailed information is here given regarding trade conditions met in various sections of India and the routes which trade naturally follows from coast to interior, with particulars regarding primary and secondary distributing points and the territory served from these points.

By Charles Sumner Turner

A MAJORITY of the leading motor trading firms in British India were evolved within or from old established merchant firms whose business activities included sales agencies for engineering supplies. Under this category were included motor car agencies, and in time these were assigned to a special department of the business or to separate companies. Ample facilities of finance, personnel and establishment, in combination with choice of best available British and Continental car agencies, assured pre-eminence in the trade to the firms so evolved. In the last year before the war, when American cars in India were a negligible quantity, the establishments of the leading motor trading firms in Calcutta, Bombay and Madras were impressive. Outside of these cities motor trade was negligible. Some of these companies possessed exceptional facilities of plant for service and body building, essential to a proper treatment of high-class European motor car trade at that time.

During the war period the only motor car source of supply was America. Most important American car agencies were attracted to the few pre-eminent firms, and several firms of minor importance to the motor trade of pre-war days attained much success and extension of their organizations through their control of important American agencies. In the post-war years many new motor trade enterprises were instituted, but the future of some of these is problematical at this time.

In the two years of 1919-20 British India imported from various car exporting countries approximately 26,000 passenger cars; the greatest quantity in any prior two-year period having been 8000 cars in the years 1916-17, against which 3000 to 4000 cars was a fair average of imports over a two-year period before the war. This shows a most interesting and extraordinary development.

From the viewpoint of an American motor car sales executive, it is apparent that selling organizations in India, with two or three conspicuous exceptions, have not attained physical and financial development commensurate

with the amount of business undertaken in the past two years. It is not far outside the facts to estimate the large quantity of cars imported into India in 1920 being little more than half the quantity originally ordered.

Under normal conditions any trade development in India is a slow progress. It has been plainly seen that the extraordinary business undertaken in a short period was considerably in excess of what could be readily assimilated through the facilities of trade present or immediately in prospect.

IN July, 1919, the British Trade Commissioner in India and Ceylon made the following comment:

"The advent of the motor car has revolutionized life in India, and together with the common use of the electric fans, has enormously added to the comfort of Europeans, especially in remote interior districts. The car is popular with Europeans and natives alike and there is little doubt that the demand from India will reach an intensity in the future which would not have been credited in pre-war days."

Capable management of an important motor trading firm in India requires superior ability and considerable capital. It is a serious matter to obtain the necessary capital to pay factories for cars five to six months prior to the arrival of the cars in the territory. When firms must borrow capital or use the capital facilities of shipping, or other firms, a factor is introduced which may be helpful or not, according to the disposition toward the motor trade of those controlling these facilities. English capital facilities

are quickly assigned to new trade channels and purposes essential to British trade and industry, and such capital was a conspicuous factor in our large motor trade of recent years with India, during which time America was, until the very recent past, the only source of motor car supply for that market. American motor car and other trades do not now present the attraction they did to British trading capital during the war and post-war periods. British capital in India is primarily a trade facility, and in view of the preponderant British trade of that market, capital has many opportunities for use, is generally assigned to the most secure and convenient channel. The necessity for the application of American credit facilities to this trade in a greater degree than in the past is obvious.

Other factors such as personnel, diverse conditions of peoples, politics and trade peculiar to different places and territories throughout India define the logical sphere of influence of many firms.

American car manufacturers whose export trade is de-

pendable or who plan to gain a share of this trade, have much to do, as regards the Indian market in particular, in the way of interpreting to dealer trade requisite methods for quantity distribution of American automotive products, since such methods are unlike British and Continental methods.

For America to secure the largest share of the Indian motor trade our manufacturers must accord the market the same intimate treatment accorded to our business with the United Kingdom, which foreign market alone exceeded the importance to us of India in 1920.

An excess of agencies, in all classes of trade, is a characteristic of most important firms in India, including those in the motor car field. The condition manifests the apparent path of least resistance to sales effort, and we had the same here in America at a comparable stage of our motor trade evolution. Below are shown agencies exercised by several important firms, according to announcements that have come to the writer's notice.

Firm at Calcutta and Bombay	Firm at Calcutta, Bombay and Allahabad	Firm at Bombay
Panhard & Levasor, Berliet, Minerva, Mors, Bianchi, Angus Sanderson, Bean, Vauxhall, Cadillac, Studebaker, Dodge.	Sizaire-Berwick, Austin, Briton, Talbot, Cubitt, Calthorpe, Guy "8," Castle "3," Royal Enfield Cycles, Bat Cycles, Austin Trucks, Halford Trucks, Velie, Briscoe, Harley Davidson Cycles.	Fiat, Sunbeam, Angus Sanderson, Vulcan, Morris Cowley, Morris Oxford, Wolseley, Austin, Leyland Trucks, Thornycroft Trucks, Vulcan Trucks, Willys-Overland, Willys-Knight, King, Garford Trucks.
Firm at Colombo	Firm at Madras	Firm at Calcutta
Auto Carriers, Austin, Swift, Sunbeam, Rover, G. W. K. Humber, Berliet, Willys-Overland, Garford Trucks, Harley Davidson Cycles.	Daimler, Vauxhall, Sunbeam, Wolseley, Angus Sanderson, Studebaker, Chevrolet, Federal Trucks.	Daimler, Standard, Talbot-Darracq, Commercial Trucks, Mathias, A. U. B. Willys-Overland, Oakland, Garford Trucks, Hupmobile.

One solution appears in demonstrating to some dealer controlling an important American agency the desirability of restricting his sales efforts to a minimum number of makes. Another is to encourage and assist the development of new firms and influence their activities.

Before the war the urban trade of Calcutta, Bombay, Madras, Rangoon and Colombo was practically the only important motor car trade in India. Now conditions are greatly changed.

The accompanying map shows where throughout India there are motor trading firms at the present time. The lines indicate logical relationship of major and minor places. This presentation is fairly comprehensive of places where motor car business is being done, and undoubtedly the near future will find this trade appreciably extended to other points not shown on the map.

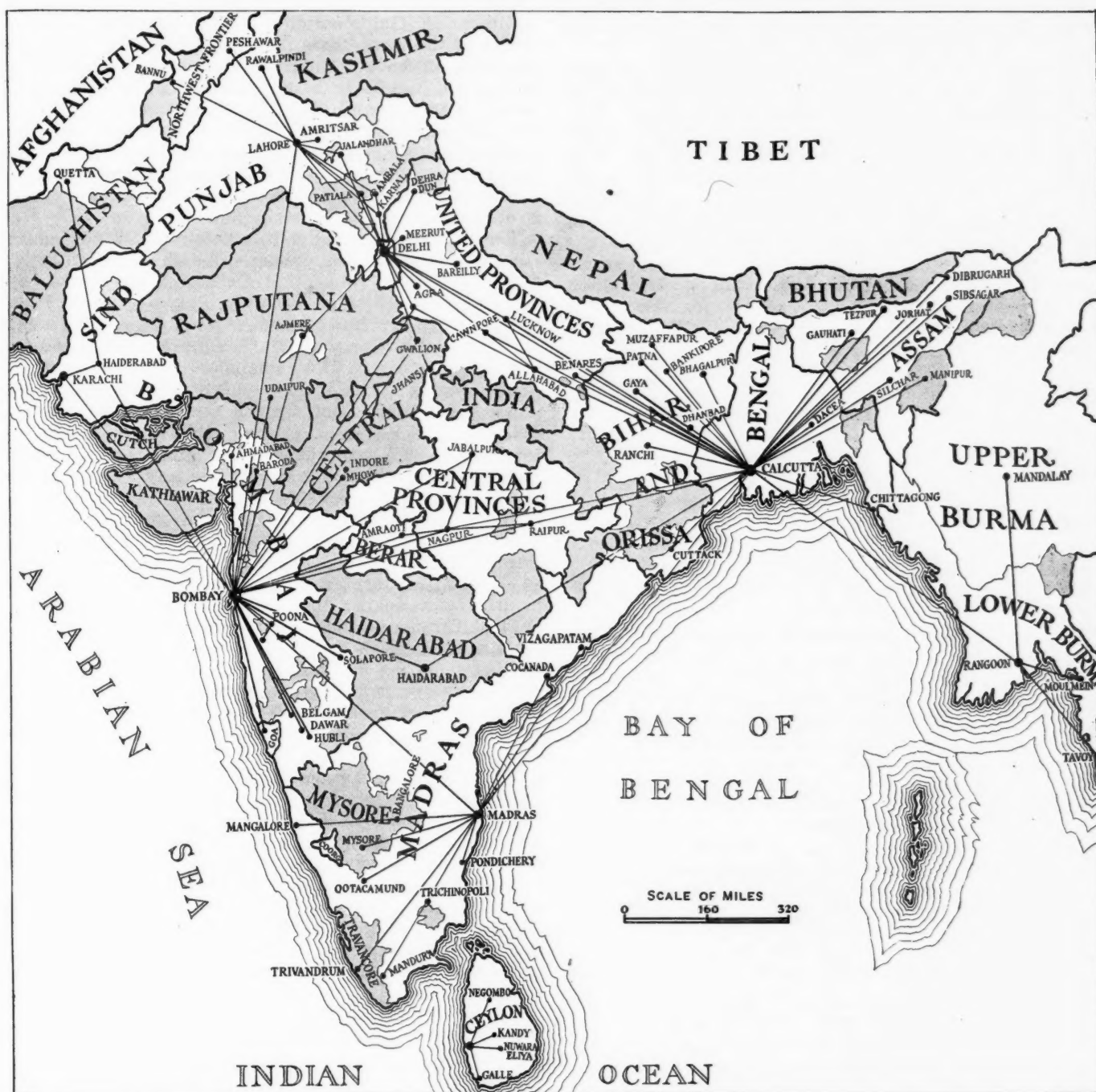
Principal Ports of Entry

The principal points for car imports into India are Calcutta, Bombay, Madras, Karachi, Rangoon and Colombo, Ceylon, at which points the largest motor trading firms are established. The motor trade development of the interior is progressing rapidly, and such places as Delhi, Lahore, Cawnpore, Lucknow, Nagpur and Hyderabad (Deccan) are to a considerable degree removed

from their former trade dependence on the chief coast ports.

The following outline of principal distributor and sub-agency points and relative territory presents an intelligent basis for allocating agencies throughout India and Ceylon at this time:

Principal Distributing Point	Sub-Agency Point	Territory	
		Minor	Major
Calcutta	Dacca, Chittagong, Gauhati, Tezpur, Sibsagar, Jorhat (sub-div. of Sibsagar), Silchar, Manipur, Dhanbad, Ranchi, Gaya, Bhagalpur, Muzaffarpur, Cuttack, Patna, or Bankipore,	Kamrup, Darrang,	Bengal Province Assam Province Bihar and Orissa Province
Delhi	Allahabad, Cawnpore, Lucknow, Benares, Agra, Aligarh, Meerut, Dehra Dun, Jhansi, Bareilly, Gwalior,	Patna,	Delhi District United Provinces Bohilkhand Div. Gwalior State, Central India Provinces
Lahore	Ambala, Karnal, Amritsar, Jullundar, Rawalpindi, Patiala, Peshawar, Bannu,		Punjab Province Patiala State, Northwest Frontier Province
Bombay	Ahmadabad, Poona, Belgaum, Sholapur, Dharwar, Hubli (town in Dharwar), Mahdabaleshwar, Baroda, Indore, Mhow, Udaipur, Ajmer, Nagpur, Jubbulpore, Raipur, Amraoti, Hyderabad, and/or Secunderabad	Baroda State, Indore State, Indore State, Mewar State, Merwara State,	Bombay Presidency Central India Provinces Rajputana, Central Provinces Berar Province Hyderabad State
Karachi	Hyderabad, Quetta,	Sind	Bombay Presidency Baluchistan
Madras	Vizagapatam, Cocanada, Trichinopoli, Madura, Ootacamund, Mangalore, Bangalore, Mysore, Trivandrum, Quillon (Kollam),	Godaveri, Nilgris, South Canara, Mysore State, Mysore State, Travancore State,	Madras Presidency



Map of India showing ports of entry, trade centers and territory served from each. The shaded areas are the native states

Rangoon	Burma
Mandalay,	
Moulmein,	
Tavoy,	
Colombo	Ceylon
Kandy,	
Nuwara Eliya,	
Galle,	
Negombo,	

The sub-agency points shown are located within administrative divisions or districts of same name as the town, where not otherwise indicated. Such districts, owing to the present stage of motor trade development, would not, in many cases, exactly define the sphere of trade influence of the places shown.

With regard to British India proper (which excludes Ceylon), in former days the motor trade at interior points of middle and northern India was handled almost entirely through or by firms at Calcutta and Bombay, and

some of the important firms of these two cities now have establishments at interior points.

Whatever method a car manufacturer might adopt for the purpose of advancing his business in India, his objective should be a minimum of distributor dealers at the eight principal points shown, and territory, therefore, assigned generally as indicated. In view of the increasing trade importance of interior territories and the firms therein, it is possible to effect principal arrangements at Cawnpore, Lucknow, Allahabad, Nagpur and Hyderabad (Hyderabad State). The motor trade of Central India, Central Provinces and Hyderabad State, when not dealt with directly, comes logically within the trade influence of Bombay, and the last named is strongly influenced from Madras. Most of the places shown within Central India and the Central Provinces being on or near the main transcontinental routes, more Calcutta controlled agencies might be established.

**Registration of Motor Cars, Trucks and Cycles in British India
as of March 31, 1920**

	Cars and Trucks	Cycles	Total
Bengal (Calcutta).....	6,373	1,542	7,915
Assam	355	83	438
Bihar and Orissa	1,020	375	1,395
Delhi	204	69	273
United Provinces (Allahabad)	1,076	556	1,632
Punjab Provinces (Lahore)	1,617	1,108	3,618
Bombay (includes cycles)	10,180	...	10,180
Sind (Karachi)	428	209	637
Madras City	2,846	1,389	4,235
Madras Presidency	920	710	1,630
Central Provinces ((Nagpur)).....	423	302	725
Rajputana (Mount Abu)	29	20	49
Northwest Frontier Prov. (Peshawar)..	476	371	847
Burma (Rangoon)	2,432	1,186	3,618
Ceylon (Colombo)	3,000	1,650	4,650
Total	28,379	7,920	36,299

In the thirteen months following the above registration date, to April 30, 1921, the total imports of vehicles into India from all sources was approximately as below:

Cars	15,757
Trucks	2,957
Cycles	5,187
	23,901

Some presentation of territorial arrangements of the Ford dealers in India is interesting. The Ford Motor Co. of Canada, Ltd., supplies the Indian market, and in relative local advertising to the distinctive Ford trade emblem is added the legend "Made Within the Empire."

The currently announced arrangements of the above firm for India are as follows:

Bengal-Assam-Bihar and Orissa-Delhi District and United Provinces

Kilburn & Company, Managing Agents, Calcutta.

Ford Motors (Calcutta), Limited, Calcutta and Dhanbad. (Dealing exclusively in Ford Products.)

Works and chief service station, Russa Rd., Calcutta.

Town service station, Mission Row, Calcutta.

Sales and showrooms, Chowringee Road, Calcutta.

Branch and service station, Dhanbad.

Sub-Agents

Bengal—Ford Motors (Calcutta), Ltd., Dhanbad.

Bihar and Orissa—Arthur Butler, Ltd., Muzaffarpur.

Khemraj Puramnall Sarawji, Ranchi.

Massidin Bros., Bhagalpur.

Delhi—Russa Engineering Works, Ltd., Delhi.

Mohd. Ekram Khan & Co., Benares.

The Cawnpore Motor Co., Cawnpore.

The Oriental Motor Car Co., Lucknow.

H. Pestonji & Co., Agra.

The Star Motor Co., Dehra Dun.

Gilbert & Sons, Allahabad.

Assam—Russa Engineering Works, Ltd., Dibrugarh.

Kilburn & Co., Tezpur.

John Smeal & Co., Silchar.

G. F. Jeffrey, Esq., Manipur.

Central Provinces—The Bundlekand Cycle and Motor Co., Jhansi.

A. Ahmedjeebhoy & Co., Raipur, and The Krishna Stores, Aligarh.

North Indian Motor Co., Bareilly.

The Punjab Motor and Carriage Co., Karnal.

Norman Orde & Co., Meerut.

Burma—Ford Motors (Burma), Limited, Rangoon, Burma.

Bombay-Baluchistan-Punjab and Northwest Frontier Provinces

Ford Automobiles (India), Limited, Bombay and Lahore.

Madras—Oakes & Co., Madras.

Ceylon—Brown & Co., Limited, Colombo.

Kilburn & Co., mentioned above, are the managing agents of the firm, Russa Engineering Works, Ltd., with principal offices at Calcutta and branches at Bombay, Dibrugarh, Gauhati, Tezpur, Karachi, Lahore, Delhi, Jorhat, Rangoon and Madras. This is the most important and extensive motor trading organization in India, their American agencies including Hudson, Essex and Paige cars. There are other important motor car firms having principal offices at chief coast ports and branches at other trade centers.

The British Indian Empire contains 1,802,657 square miles; the provinces under British administration (Bengal, Assam, Bihar and Orissa, Madras, Bombay, Baluchistan, Northwest Frontier, Punjab, United Province, Central Province, Burma, Ajmer, Coorg and Andaman Islands) comprise 1,093,074 square miles, or 60 per cent of the total. The remainder is included in the Native States. The total population of British India is 315,156,396, of which British territory contains 244,267,542, or 77½ per cent, and the Native States 70,888,000, or 22½ per cent. (The gross population of India is not particularly significant to a review of the motor trade of that country.)

These stupendous figures can be grasped only by contrast. The area of India is equal to the whole of Europe, except Russia. Burma is about the same size as Austria-Hungary; Bombay Presidency is comparable in area with Spain; Madras, the Punjab, Baluchistan, Central Provinces and Rajputana are each larger than the British Isles.

The population of India exceeds that of Europe without Russia and is three times that of the United States. The United Provinces and Bengal, with the Native States attached to them, both have as many inhabitants as the British Isles.

All of the Native States are under the control of the Indian Government, but generally they are not under British Indian Government administration. It is impossible in this article to attempt any comment on the diverse conditions present in these states. Their present value to the motor trade is generally unimportant, except as regards limited purchases of highest priced cars by the rulers of various states, however, the potentialities of future trade are interesting, as undoubtedly motor transport and trade of contiguous districts where that trade is developing rapidly will have an effect.

At and from Calcutta, a city enjoying financial, industrial and commercial supremacy in India, motor trade has experienced its greatest development in India.

Delhi, the capital of India, is rapidly attaining major importance as a motor trade center. British firms are extending their organizations thereto.

At Madras, British enterprise dominates trade. The territory served therefrom is mainly dependent on agricultural industry; comparative poverty in readily exploitable mineral wealth and difficulty of coal supply has prohibited any industrial development comparable with Calcutta and Bombay. The Native States of Mysore in this territory is rated more progressive than other states and motor trade is active there. What little motor business is to be obtained from the Native State of Hyderabad is strongly influenced from Madras.

Within Bombay motor trade development ranks with that of Calcutta. The cotton trade and industry of India is practically centered at this place. Native capital and individuals participate in the industry and commerce of Bombay to a degree not present at the other coast towns mentioned, and this element is practically the dominant factor. Places and territories tributary to Bombay do not at this time offer like opportunities for motor trade development to those present from Calcutta. Native

States within and without (Rajputana and Central India) the Bombay Presidency present obstacles to a free diffusion of motor trade and its development.

Bombay trade has at this time considerable influence with Mesopotamia resulting from new trade routes defined by the war's exigencies, and the writer is informed that Ford Automobiles (India), of Bombay, control that territory for the particular products they represent.

Karachi, which was formerly a motor trade tributary of Bombay, has attained much independence of position during recent years, and the trade there is worthy of and desires treatment as a principal motor trading point from which the territories of Sind District, Bombay Presidency and Baluchistan would be served.

Lahore, as the distributing point for the Punjab provinces, has been a trade tributary to Bombay, and as a motor trade center has attained importance within itself and relative territory. A few Bombay motor firms maintain branch establishments there.

At Rangoon there are only a few important motor firms, the major portion of which are British. In Burma one comes in contact with the Chinese element in commerce, and in recent years they have entered somewhat into the motor trade. The interior motor trade of Burma is for the present far behind similar trade in other British provinces, probably due to insufficient enterprise. Only a few firms have been concerned with the trade there in the past, but an interesting development of motor trade anticipated.

At Colombo, Colony of Ceylon, the motor trade is mostly in British hands and an intensive trade in this limited territory is well developed. As in India the largest motor trade organizations are of British and Continental ownership and management and are exceedingly enterprising in the development of business. Native wealth and a considerable number of native firms are concerned with the motor trade. In Bombay native owned and managed motor firms rank among the foremost. With a few conspicuous exceptions native firms do not possess facilities comparable, either in employees or establishment, with those of British firms, and in the matter of a consistent loyalty to a particular agency franchise in the face of many solicitations to undertake others, much may be desired. It is believed, however, that much is to be gained by American car manufacturers cultivating such firms and assisting their development. Trade at present with some of the lesser native firms is complex, and if business is undertaken direct it should be carefully considered in all its aspects.

Only those who have had an intimate and comprehensive experience in recent years with the trade under review can fully appreciate the extraordinary development of motor car use within India that has occurred during the past few years. The relative trade development has been insufficient for effectively dealing with present and prospective opportunities and problems, although the present development is creditable to those concerned therewith, in view of the facilities at hand.

The motor car has not only caused some congestion of trade, but more congestion of traffic in the large cities where large quantities of cars were absorbed, as at times and places the native bullock cart determines the movement of motor traffic. Motor vehicle having demonstrated its efficacy and necessity to metropolitan transport problems, the elimination of the native cart is a matter of serious consideration on the part of authorities in the large cities. The report of a committee appointed to consider the problem of rapid transportation to and from Calcutta states that the replacement of bullock and buffalo cart transport by motor transport is an urgent necessity and recommend that the possibility of fixing a definite date after which bullock and buffalo carts will not be permitted to use the streets be very carefully considered.

Throughout the interior of India are great systems of roads and practically all of the places shown on the accompanying map are connected by main trunk roads, and these are supplemented by a comprehensive system of secondary roads."

Total mileage of railways in India open for traffic exceeds 36,000 miles. Total number of passengers carried by all railways annually is approximately 500,000,000, and total weight of goods carried, approximately 90,000,000 tons. Railway transport supports 1,062,493 people, the estimated number of actual workers being 474,184.

That India is experiencing a reaction from extraordinary prosperity and an exceptionally unsatisfactory internal trade year, does not alter the future outlook for motor trade in that market. There is a large trade to be obtained there by American manufacturers in the future, but it is necessary to discount much of the war and post-war experience, as radically changed trade conditions are now present. Trade possibilities exist and can be secured by American manufacturers if they are prepared to face competition and meet the conditions here outlined.

Tractors Used in Alaska

TRACTORS have succeeded dogs as the motive power for freight in many parts of Alaska, where these tractor trains are now operated regardless of the low temperatures. This is made possible by a recently perfected frost pad which protects the cooling system in all temperatures. These machines have kept to their freight schedules at 40 below zero. The photograph shows a Holt tractor with its train.

An engineering asset of this particular machine will be found in the articulated roller frame and the equalizer bar which join the two portions of the tractor truck and supporting roller. This latter factor enables the tractor to conform to the unevenness of the ground and to climb over obstacles and yet assures traction. It is one of the refinements and modifications made possible by war experience. In one district the tractor has caused a drop of winter freight rates from \$350 to \$25 a ton.



Holt tractor used to haul freight in Alaska

Inaccuracy of Current Unemployment Statistics

Present unemployment statistics are based upon past employment figures which were abnormal. Mr. Tipper discusses the inaccuracies and points out the danger of hasty conclusions. The importance of the problem is not minimized, however, since responsibility must be recognized.

By Harry Tipper

A CONSIDERABLE amount of discussion has been going on in the newspapers concerning the changes in employment and the extent of unemployment in the various parts of the country. These discussions have been reinforced by statistics from State and Federal authorities and from the American Federation of Labor—the only places where general statistics are accumulated from the original sources regarding the degree of employment.

A great deal of stress has been laid upon the amount of unemployment and the figures of the actual number of people unemployed have been used many times to inforce an argument or to illustrate a condition.

That there is a great deal of unemployment is unquestioned. The lack of activity in many industries and the reduction of activity in many others from last year have altered the amount of employment in connection with these industries and the workers who have been let out have either swelled the ranks of the unemployed or found work of some kind elsewhere.

It is very difficult, however, to arrange general statistics so that they are reasonably accurate, unless all the factors are known and considered in the analysis of the individual statistics from which the general compilations are made.

The spirit of turnover in labor has its effect upon the number engaged in or liberated from an industry, as the amount of production fluctuates. The tendency of workers to move about in their own special occupation from one establishment to another or from one industrial group to another makes it a very difficult matter to determine the actual number normally engaged in such industries or to determine the net number left out of employment as they readjust themselves.

There are no statistics indicating the number of people who came from the farms during the high wage period at the end of the war and who have returned to their original occupations. There are no statistics indicating the number of women who entered employment at that period but who were normally unemployed in industry and who have since gone back to domestic occupations.

It is impossible to determine those who have been re-employed perhaps casually and perhaps on short time since they were discharged from the industrial jobs they previously held, and the relative factor of turnover has not been determined in any of these cases.

As a consequence, the statistics of unemployment are very inaccurate as an index of conditions and more inaccurate as an index of the fluctuation of

buying power. The statistics of unemployment have run between four and six millions for several months, rising and then falling as the depression developed.

It is obvious that the straitened circumstances of the workers would be more visible and the distress more acute if these statistics could be accepted on their face value. The savings of the worker on the average are not sufficient to withstand a long siege and unemployment to this extent would put a severe strain upon the resources before such a long period had elapsed.

During the war and after the end of the war there was an abnormal employment in many lines of industry, recruited from other lines of work. The bidding for labor had proceeded to such lengths that men without familiarity with the particular industry were accepted so long as they had a modicum of skill in the particular occupation. Those industries where the pressure for production was greatest offered the largest inducements to the workers and drew many employees from outside industries, from the farms, and from various occupations.

Such employment was abnormal, temporary, and did not represent any of the conditions of the industries in question.

The depression has not been equal in all lines. The percentage of production has varied very considerably and along with the unemployment there has been a certain amount of re-employment going on all through the depression and a return of the workers to their original occupation or type of life.

It will be impossible to get a true picture of the extent of unemployment in each line of industry until the reports received by the governmental authorities and the Federation of Labor are more detailed and the analyses more accurate in arranging the general compilations.

Furthermore, it is impossible to determine the number of workers employed in industrial occupations, for the same reason. The number of people applying for particular kinds of work and the number of people waiting for the possibility of work are a much better indication of the local conditions of employment than the general statistics as they are gathered at present.

This does not minimize the seriousness of the situation, however, and the extent of unemployment existing at present, nor does it solve the problem nor offer the slightest suggestions for solution.

As the organization of industry becomes more complicated, the possibility of balancing the industrial organization so that its employment for all the workers within

the field becomes more difficult. The increased subdivision of the work and the rigid limitations of the system remove the flexibility from the workers' skill so that there is no opportunity to adjust the work for the maintenance of a reasonable proportion of the various occupations required for the industrial group or establishment. When they are used to working at a simple subdivision of an occupation, with its rigid and monotonous technique, the workers lose their capacity and adaptability and they are unable to operate under new circumstances.

This difficulty has been experienced for a great many years in Great Britain where the unemployment has been a continuous problem for a quarter of a century at least.

The problem has not been of great importance in this country up to the present because a large part of our working population is drawn from immigration and most of the immigrants have been accustomed to the adaptability of the older methods practised in the countries from which they come.

Nevertheless, the increasing rigidity of labor is a problem directly connected with the future of the unemployment question and the organization of industry will be obliged to answer in some way or another the question of reasonable permanent employment within the industrial group. When the worker is willing to work and cannot find work because the instruments of his skill are idle, he is likely to charge industry or his government with responsibility for his condition.

Where the unemployment becomes a continuous problem for a number of years, as it has been in Great Britain, this demand settles into a well-defined policy of action and may result in governmental interference with its burden of taxation and its obnoxious regulation.

It is amazing that so little attempt has been made to consider the factors, the difficulties, and the responsibilities in the question of unemployment and that so much unrest is allowed to foment quietly because numbers of workers are deprived of their work without ap-

parent cause and have no other outlet for their restless activity save their thought upon the matter.

The general employment statistics as they are reported at present undoubtedly exaggerate the difficulty because the factors of re-employment and adjustment have not been considered in the compilation.

Accurate statistics on this matter are very desirable. Ignorance of the problem leads to a great deal of idle speculation and misapprehension on the subject. Some of the editorials which have been written in the newspapers would have been differently arranged if all the factors were understood and much of the propaganda that has been spread out to the unemployed would have lost a good deal of its significance.

Without a knowledge of the factors, attempts to relieve the situation have proved expensive and inefficient wherever they have been tried by authorities although small experiments by local communities and local establishments have met with some measure of success.

The whole question of statistics on labor is important and complicated, but particularly in the fluctuation of unemployment better examinations are necessary, more correct analyses and compilations should be established. Of course, this cannot be done until the manufacturer and employer generally have developed more accurate statistics and are in a position to give these detailed analyses to the governmental authorities.

As it stands at present comparatively few factories have all the necessary records in such shape that they represent a true analysis of the employment situation in their case. Consequently, the general statistics provided from hundreds of thousands of sources are arbitrary and inaccurate. Because they are inaccurate they lead to false conclusions and enlarge the difficulties of the case.

The unemployment problem is an important one, but it is not likely to be affected by experiment until the factors that enter into it are more definitely understood in their relative influence upon the fluctuations.

Service Dominant Idea at M. A. M. A. Credit Meeting

(Continued from page 554)

"D—Is the buyer a corporation, a partnership or an individual?"

In a paper prepared by F. N. Sim, advertising and assistant sales manager of the Timken-Detroit Axle Co., who was unable to be present, he advised the revamping of sales strategy.

"Let's stop trying to get temporary advantage of each other by untimely price cuts, market juggling, etc.," he said. **"Let's have plenty of competition but let's make it good-natured and square and then let's spend most of our time making people want to buy automobiles."**

"Let's revamp our advertising, change our selling talk and revolutionize our thinking on this subject."

"There are thousands of car and truck owners secretly wishing someone would come along and persuade them to buy. They want to be sold. The buyers' strike they talk about is in the majority of cases a mental attitude. It is not wholly sincere. While there may be somewhat less buying power at present, there is enough on tap to keep the industry moving."

Ezra W. Clark of the Clark Equipment Co., Buchanan, Mich., advocated intensive development of the special motor bus as a means of increasing

business. He said experience had shown that converted motor truck chassis would not serve the purpose. He declared there were tremendous possibilities along this line and that his company was taking advantage of them by building special motor bus axles.

E. H. Broadwell, vice-president of the Fisk Rubber Co. and president of the association, presided at the sessions. M. L. Heminway, the general manager, sketched the achievements of the year, paying particular attention to the plan of forming groups of manufacturers in the same line of business.

The association's credit department as "the safety valve of the industry," was described by C. A. Burrell, the efficient manager of the department. The work of the department has been done so well that he was able to tell the members that if they had been governed entirely by its reports they would not have a bad account in their books. The department is intimately familiar with the financial affairs of nearly 800 manufacturers and more than that many jobbers. Members were urged to make wider use of the credit department.

"The industry is fundamentally sound," Burrell said, **"Morale is what wins battles and the automotive industry never retreats."**



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Maintaining Quality

IN cutting the cost and selling prices of passenger cars, is quality going to suffer? Every car manufacturer is welcoming with open arms any practical means of decreasing cost of manufacture. This is as it should be so long as quality is not sacrificed at points where it is essential to proper performance. There are places in some designs at least where machining limits are held much closer than necessary. In such places a saving can often be made by allowing wider limits without changing performance in the slightest degree. But this legitimate saving should not be the signal for using less care in maintaining close limits where these are required for proper running fits and adequate durability.

One of the greatest savings in manufacturing cost is that resulting from more efficient labor. Several plants are now building nearly twice as many cars in proportion to the number of men employed as were built when labor was at a premium and inefficient.

Since the cost of material is one of the largest items in the total cost, there is, of course, chance to econo-

mize in that direction, but the danger here is very great. The purchasing agent should rely upon the judgment of the engineering department and make no change in favor of a cheaper article until it is evident that the change will not adversely affect the performance of the finished vehicle. A large percentage of orders for cars to-day are repeat orders, and nothing can upset this condition more certainly than a cheapening which renders performance less satisfactory or renewal and service charges more frequent.

Much has been done and is still being done to decrease the cost of manufacturing processes, but there is reason to believe that similar economy has not been brought about in the purchasing and selling departments. Selling costs are too high. Improved and more economical purchasing methods are possible. These are questions which every wise manufacturer should weigh carefully.

Cost cutting at the expense of quality is at best a dangerous proceeding. In any case it should not be resorted to until every possible economy in purchase, manufacture and selling has brought the cost as low as this practice permits.

Export Market Outlook

DURING the year 1920 American automotive exports attained the enormous value of over \$382,000,000. In recent years our exports have grown at a tremendous rate, as may be judged from the fact that as recently as 1914 our car and truck exports together were valued at only \$28,000,000. This growth came about without any great efforts on our part. Throughout the war there was no competition in foreign markets, as all the industrial countries were engaged in the fray; in fact, the needs of the belligerents greatly swelled our exports. After the war, for a period extending over nearly two years, the industries of most of the European industrial countries were unable to produce a surplus for export, partly owing to the difficulties of getting back to a peace basis and partly owing to the abnormal demands of their own home markets. The American industry alone was prepared to make deliveries, and it reaped the advantage of this preparedness.

The period of no competition in the world's automobile markets has come to an end, and the question now is whether we can hold our own under the new conditions. On the one hand the outlook seems promising. Large-scale production of automobiles as we know it to-day is confined practically to this country, and where purchasers buy strictly on the basis of price and service value we will probably have little difficulty in meeting all competition. One thing in our favor is that technical development never stopped here, while little was done in Europe along this line for about five years. Previous to 1910 most of the striking improvements in automobile design originated in Europe. Since then America has been leading in the creation of new features. We need only mention the electric starter, the spiral bevel gear and the vacuum fuel feed. There can be little doubt that such pioneering in technical development as represented by these improvements adds to the prestige of

the American car in the eyes of foreign buyers.

On the other hand, private passenger cars are not bought wholly on the basis of price and service value. Appearance, tradition and careful handwork in the finishing of mechanical details have their influence, especially on buyers in the higher priced classes and in countries where the automobile is less an article of utility than it is here. That we shall have a hard fight to maintain our pre-eminence in the export field is indicated by recent figures on Belgian imports. During the first half of 1920 the United States led in these exports by a wide margin, but since then there has been a very pronounced change. The imports from the United States have dropped to a small fraction of their last year's value, while those from France have increased remarkably, and the latter country has secured a wide lead in that market.

One reason for this change is undoubtedly to be found in the exchange situation. Dealers in Belgium importing cars from the United States must pay in dollars, which are at a very high premium as compared with the depreciated Belgian currency. When they import from France they pay in French francs, which are still more depreciated than Belgian francs. Besides, Belgium is more or less contiguous to the French industrial district, and its language is the same as that of France, which facilitates commercial intercourse. Perhaps the Belgian purchaser looks upon the French product very much like the Canadian upon the U. S. product.

The change in the Belgian imports shows that we have not a very firm hold on some of the markets acquired during the war. The consoling thought is that Belgium in this respect is not an average country, but is influenced by close business ties to one of the countries strong in automobile production.

An Ideal Transmission

THERE appears to be a disposition among many engineers to regard the present type of gearbox as so near to perfection that but little effort is being made to produce new and more suitable types. Certain changes in detail design or control mechanism are occasionally attempted, but the major elements have remained about the same for many years.

An ideal transmission would, however, have certain characteristics not possessed by the conventional type. The primary function of the gearbox is to increase the torque applied to the rear axle when the torque of the engine is not sufficient to propel the car at the desired speed, and the gearset must in any case perform this function if the engine is kept small and light. It is conceivable, however, that the gearset might be made to perform another function, namely that of so adapting the load of the car to the output of the engine that the latter would always operate at full load and consequently under most favorable conditions with respect to fuel economy.

Such a mechanism is theoretically possible. Whether it can be reduced to practical form and be so designed as to be manufactured at a reasonable price is a question which is at least worthy of careful consideration. The fuel saving which would be

made possible by such a device would be very considerable, since it is a well known fact that economy at full load is more than double as good as that attainable when the engine is throttled so as to run, as it does most of the time in the average passenger car, at one-fifth to one-third full load.

Efforts in this direction have been made from time to time in the case of gas-electric vehicles, but first cost, weight and other considerations have militated against their commercial success. It is not beyond the realm of possibility that the desired results can be attained by purely mechanical means. There is room here at least for the application of ingenuity which might bear good fruit.

Producing Closed Bodies

REPORTS from various parts of the country indicate that the increased interest of the public in closed models may have a favorable effect upon fall and winter sales during the coming year. Answers to a questionnaire recently sent out by AUTOMOTIVE INDUSTRIES, moreover, indicate that manufacturers are greatly interested in the permanent top. Several are going to equip at least one model with permanent tops as standard equipment. Many others are seriously considering such a step in the near future.

This interest in permanent tops, together with the recognized gain in popularity of the regular closed job, brings to the foreground body production problems that hitherto have not been prominent. Price is undoubtedly a large factor in limiting the number of closed cars sold at present. Many persons who can afford to buy a given open car cannot afford to pay \$600 more for a closed job. The increased cost of the closed car lies very largely in production difficulties at present. Close study of body production methods may make considerable change.

One manufacturer stated recently that he considered it perfectly possible to so perfect closed body production methods and equipment that a closed job could be turned out for the same price as an open one. In fact, he has set out to do this very thing in his own plant. Whether or not he is successful, he is undoubtedly correct in his belief that the cost of closed body production can be materially reduced.

Improvements both of design and production, moreover, may be expected in permanent tops, so that the cost of these will be correspondingly reduced. Very close attention can well be given at this time to both the market analysis and production problems of the permanent top and the closed body.

IF every car and truck manufacturer would make it a point to see that each new model is capable of traveling under average conditions farther per gallon of fuel than the next earlier model the total saving in fuel during the life of the vehicles so improved would be astounding. Certain vehicles now extensively used in New York average nearly eight miles per gallon. A few years ago similar vehicles in the same service made about two miles. Persistent effort might easily produce similar results with other vehicles. Isn't it worth trying?

Sales Exceed Dealers' Expectations

New Price Cuts Have Not Deferred Buying

Entire Industry Surprised at Way Business Holds Up—No Real Slump Likely

NEW YORK, Sept. 21.—Probably the most striking fact disclosed by a study of conditions in the automotive industry is that they continue to be better than expected. August was the best month of the year. When price cutting began at the end of August the general belief was that there would be a sharp falling off in retail sales on the theory that prospective buyers would hold off in the expectation of further cuts. No accurate data are available on this subject, but reports from numerous distribution centers indicate that sales are holding up very well in comparison with August, and that if there is a falling off it will not constitute anything in the nature of a "slump."

Continuance in Doubt

It is not to be expected that sales will continue at the present level until the beginning of 1922, but neither was it to be expected that business in July and August, which has been a perennial slack season, would be as good as in May and June, which ranked among the best months of the year. Manufacturers believe there will be a gradual "tapering off" the rest of this year, but this "tapering off" is not yet strongly in evidence.

Judging the rest of the year by the experience of the first eight months, the decline in sales will not be as sharp as has been expected. There is in prospect an unusually heavy demand for enclosed cars, and many attractive new models will be brought out this fall at prices much less than those which prevailed a year ago. This will tend to stimulate sales.

Buying Power in the South

Buying power is greater in the South than it has been in many months and there has been considerable stimulation in sales in that section. Farmers are coming back into the market to a certain extent and export trade is slightly better. The truck market, which has been virtually dead for months, is showing signs of life.

There probably will be a few more price cuts, but the indications are that there will be no epidemic of them, and the industry is hopeful that prices will remain fairly well stabilized until the

show period in January, although a period of sharp competition has returned.

Production for the industry as a whole is running about 70 per cent of the same period last year, but it should be remembered that production at that time had begun to fall off because of the "buyers' strike" which was well under way. A few of the quantity producers are running their plants practically at capacity, but it is probable a majority of the passenger car factories are running at not more than 50 per cent of capacity. It is difficult to estimate truck production, but on the whole it probably does not exceed 25 per cent of capacity. It is impossible to fix percentages of "normal," because what is "normal" for the industry has not been determined.

Reorganization Plan for Willys in 30 Days

NEW YORK, Sept. 20.—Creditors of the Willys Corp. have been notified that while negotiations for a reorganization of the company have not progressed as rapidly as had been hoped, some definite decision is expected within 30 days. Committees representing the bank and other creditors are continuing their work.

The reorganization plan under consideration contemplates that a large part of the new funds needed will be provided by a prominent firm of New York bankers who have had an engineer's report on the Willys plant at Elizabeth. This report was delayed but it was presented to the bankers last week and a definite decision by them is expected soon. Creditors are warned that it would be extremely unwise to press claims at this time although the committees state that they will not consent to an indefinite delay.

Truck Owners Fight Ohio Load Limit Law

COLUMBUS, OHIO, Sept. 21.—City and county officials assembled in the office of County Prosecutor King recently to discuss provisions of the Burke law, which limited the loads to be carried on the streets and highways of the State. The result was that steps were taken to enforce the law, which haulers and truck men believed to be very unreasonable.

The fight against the law in the conference was lead by Walter Francis of the C. & C. Haulage Co., representing truck owners, who declared that the enforcement of the law would work a great hardship on contractors and truck owners in general.

Moline Refinancing Meets with Approval

Proposed Capitalization Will Pro- vide Big Stock Issue—90 Per Cent Agree

MOLINE, ILL., Sept. 21.—New financing plan of the Moline Plow Co., which the bankers' committee believes will re-establish the corporation on a sound financial basis, has been outlined and approved by approximately 90 per cent of the interests involved.

Proposed new capitalization will provide for the \$10,000,000 of 7 per cent debentures, an equal sum in 7 per cent first preferred stock issue and \$7,500,000 in second preferred stock. Preferred stock issues will be entitled to cumulative dividends after two years. Common stock issue has not been determined, but \$10,000,000 common stock now outstanding will be traded in on the common at the rate of one share of new for ten shares of old. Majority of the common stock will be held by the protective committee for banking and commercial creditors for a period of years believed by the company sufficient to work out its difficulties.

Holders of \$7,000,000 of 7 per cent first preferred stock now outstanding will receive the new second preferred issue, par for par. Holders of \$1,500,000 of 6 per cent non-cumulative second preferred outstanding will receive one-third or \$500,000 in new common, it is said.

Banking and commercial creditors and holders of \$4,000,000 of 7 per cent notes outstanding will go into the new organization on an equal footing, it is reported. Their total claims aggregate \$20,000,000. These claimants will receive 50 per cent in debentures and 50 per cent in first preferred stock of the new issue.

Banks, it is said, have agreed to advance \$2,000,000 to the company on its notes, for immediate working capital.

Cunningham Factory to Increase Production

ROCHESTER, N. Y., Sept. 21.—Improvement in business has been noted by James Cunningham, Son & Co., automobile manufacturers, during the past ten days and the company is planning on a production of 35 cars this month. Most of the machines are custom built. The company's 600 employees are working on a basis of 40 hours a week.

At the annual meeting of the stockholders held here this week, the directors elected are as follows: Augustine J. Cunningham, James C. Dryer, John W. Fulreader, Francis E. Cunningham, Campbell A. Baird.

Peerless Deal May Be Closed Soon

Collins Would Not Get Stock's Control

**Offers to Buy 80,000 of 200,000
Shares at \$50—Half to Be
Paid in Cash**

CLEVELAND, Sept. 20—Negotiations for the acquisition of control of the Peerless Truck & Motor Corp. by R. H. Collins, former president of the Cadillac Motor Car Co., and his associates, had not been concluded at a late hour to-night. Conferences lasted throughout to-day and far into the night. The indications are said to be favorable to a successful termination of negotiations. Attorney George B. Siddall of this city, who is secretary of the Peerless Company and has been named a committee with B. G. Tremaine, president and general manager of the corporation, to negotiate the deal, issued the following statement to-night:

"The trade with Collins has not yet been made but negotiations are still pending. At a meeting to-day progress was made but in a transaction of this importance there are many points which must be covered. The stockholders of the company may rest assured that all of them will be treated alike. It probably will be several days before the matter will be brought to a conclusion."

Notification to Stockholders

Although no announcement as to details has been made by any one participating in the negotiations, information concerning it became available when circulars that are to be mailed to stockholders were seen. These are to be put in the mails when necessary signatures to the contract are obtained. The circular says that the negotiations at present are limited to B. G. Tremaine and his associates who are now virtually in control of the management of Peerless and its subsidiaries and R. H. Collins acting for himself and his associates for the sale of shares of stock in the corporation. W. C. Durant, former president of General Motors Corp., is allied with Collins. Another well defined report is that Collins will assume active management and that his word will be law as to whether or not there shall be changes in the personnel of the officers and directors.

All stockholders of the company are to be given an opportunity to sell their stock to Collins and his associates. Tremaine stipulated this should be done and his proposal has been accepted. Collins,

according to information contained in the circular notices that are ready for mailing to stockholders, is to purchase at least 50,000 shares and not more than 80,000 shares of the 200,000 shares outstanding. He is to pay \$50 a share for the stock, of which not less than \$10 a share shall be paid in cash and the balance in six equal installments which shall be paid semi-annually over a period of three years with interest at 6 per cent.

Stockholders who desire to sell on the terms given will be asked to deposit their shares with the Cleveland Trust Co. In the event that more than 80,000 shares are deposited under the agreement the amount of each stockholder's stock to be sold shall be such proportion as 80,000 shares shall bear to the total number of shares of such stock deposited. Thirty days are given for the consummation of the sale under the depository agreement, provided, however, that the attorneys may grant an extension to not later than Nov. 15.

The Peerless company is one of the largest and most prosperous automobile plants in the Cleveland district. When operating normally it employs 2,500 men. The plant covers 20 acres and it has continued its payment of dividends this year. It has paid as high as 10 per cent annually on outstanding stock and the dividend this year is 4 per cent. The corporation has a capital of \$20,000,000 with approximately \$10,000,000 outstanding.

Durant Personally Associated

NEW YORK, Sept. 21—W. C. Durant personally is associated with R. H. Collins in the negotiations for control of the Peerless plant but Durant Motors, Inc., is not involved. In this respect the relations of Durant with Collins are no different than they have been since the announcement several months ago when Collins left the General Motors Corp. that he would incorporate a Michigan company to manufacture a high class eight cylinder car.

Soon after the original announcement of Collins' plans he purchased one of the large units in the old Cadillac plant at Detroit. If his offer to the Peerless company is accepted the Detroit factory will be used for other purposes which he has in mind.

Acquisition of a well equipped factory such as that of the Peerless company will give Collins an opportunity to get to work at once with the organization he already has built up. His proposal to the Peerless company contemplates the complete redesigning of the car with the exception of the 8-cylinder engine, which he regards very highly. It is probable that in this redesigning he will put into effect most of the ideas he has had for a new car.

A.A.A. Backs N.A.C.C. on Manufacturers Tax

**Senate Expected to Be Satisfied
Industry Is United for
Revision**

WASHINGTON, Sept. 21—Endorsement by the American Automobile Assn. of the proposed manufacturers' tax on commodities which the National Automobile Chamber of Commerce has recommended, is expected to make the Senate understand that the automobile industry, from manufacturer to user, is united in an effort to obtain a more equitable form of tax assessment through a revision of the present internal revenue laws. The Smoot bill, which would make the necessary revisions, will be introduced by Senator Smoot this week, when Congress reconvenes.

The brief in support of the plan is a substitute, for the House bill was filed on Saturday with the Senate Finance Committee by the Manufacturers' National Tax Committee, of which Charles E. Hanch of the National Automobile Chamber of Commerce is vice-chairman. The report which Hanch signed as chairman of the tax committee of the N.A.C.C. says that the Smoot plan is approved because:

"Without lessening the amount of revenue, it removes the burden of invidiously discriminating war taxation from selected industries upon whom it was imposed for the purpose of limiting particular production as well as raising revenue. The reason for such limitation having expired, the policy should die with it, or it should be a popular tax because its amount is definite and certain and its relation to costs easily calculated by the mass of buyers of average intelligence. It cannot therefore be made an excuse for unduly enhancing price or a mask for inexcusable extortion."

The A.A.A. directors, in a statement said that the main motive in endorsing the manufacturers' tax is to give relief to the business interests of the country and to provide employment to more than 5,000,000 now idle men.

Report Ford Plant Will Run Only 5 Days Denied

DETROIT, Sept. 19—Reports that the Highland Park plant of the Ford Motor Co. would be operated hereafter on a five-day basis were emphatically denied. The plant was closed Saturday to balance stock, but work was continued as usual at all branches. The monthly production schedule has not been changed.

Owen Tire Company in Receiver's Hands

Action Follows Charge of Stockholder That Funds Were Spent Extravagantly

CLEVELAND, Sept. 21—Manton M. Scott, this city, has been appointed receiver for the Owen Tire & Rubber Co., which conducts a tire-making plant at Bedford, a suburb of Cleveland. The appointment was made upon the application of William C. Gleason, a stockholder.

Gleason in his petition set forth that there are 3000 stockholders of the corporation, whose plant is on a 14 acre tract. He said that the company is greatly indebted for large quantities of material, some of which has been delivered and some of which is to be shipped from vendees; that creditors are annoying the company with their claims, and that many threaten to sue. He asserted that large sums of money have been illegally paid out for salaries and as commissions and for expenses.

Insolvency Alleged

The petitioner alleged that the company is not insolvent, and that a receiver was needed to protect company interest for the present, to conserve the interest of stockholders by withholding appropriations for extravagant purposes and to conduct the business.

The debts were placed at \$800,000. In order to pay claims, the directors are attempting to sell \$600,000 gold bond notes, but in the last 30 days only \$14,000 has been realized from these sales. The court is asked to restrain this action.

Committee Is Named

On Aug. 8, a special meeting of stockholders was held and a committee was named to act with the directors and the active managers, but, it was charged, the proper co-operation could not be obtained.

At the plant of the company it was stated that the assets are greatly in excess of the debts and that the concern is far from being insolvent. The corporation was organized about two years ago.

Gas Production 807,980 Gallons Lower in July

WASHINGTON, Sept. 19—Production of gasoline fell off 807,980 gallons per day during July, as compared with the month of June, according to estimates prepared by the Bureau of Mines to-day. However, the output for July represented an increase of 196,542 gallons over the daily average production for the year 1920. Stocks of gasoline on hand at the refineries were produced during the month of July by approximately 66,000,000 gallons.

The daily average production of gasoline for July was 13,536,833 gallons,

which is a decrease from June of 807,980 gallons per day, but this is an increase of 196,542 gallons over the daily average production for the year of 1920. Stocks of gasoline on hand at the refineries were decreased during the month of July by approximately 66,000,000 gallons.

The daily average production of lubricating oils for the month of July was 22,635 larger than the production for June. Stocks of lubricating oils were decreased during the month of June by 2,244,823 gallons.

15 Per Cent Cuts Made on Standard Trucks

DETROIT, Sept. 16—Price reductions averaging 15 per cent on its entire line were made by the Standard Motor Truck Co. to-day, the announcement being based upon a general reduction determined upon by leading parts makers, and by manufacturing economies effected through higher labor efficiency.

The new Standard prices are:

	New	Old
Model 1-K 1-1½ ton....	\$1,800	\$1,950
Model 76 2½-3 ton.....	2,000	3,100
Model 66 3½-4 ton.....	2,800	4,000
Model 5-K 5-7 ton.....	4,400	5,250

Under the influence of lower prices a much more active demand in heavy duty trucks is looked for by Standard in the remainder of the month of September with probable increases in October and the early winter months. August without any particular sales stimulus proved to be the best month the company has enjoyed in a year.

Aircraft Plant May Be Built in America

WASHINGTON, Sept. 19—It appears that the plea of the National Advisory Committee for Aeronautics for further researches into dirigible transportation will have a salutary effect upon the development of this industry in the United States. The destruction of ZR-2, built in England for the United States Navy, brought about the resolution of the Advisory Committee and may result in the establishment of an aircraft plant in this country under the auspices of the Government, in order to conduct experimental work for obtaining definite information regarding the strength and quality of materials and girders used in the construction of airships and for the development and checking of theories used in the general design of airplanes.

Several groups of American financiers are deeply interested in the promotion of aerial transportation, especially through the use of rigid air ships. Negotiations are now under way with the DuPont, U. S. Steel Corp. and General Electric Co. and other powerful financial interests for the establishment of dirigible routes to New York and Chicago. Several conferences have been held and experts employed by the syndicate have reported a system of dirigible transportation would be feasible and profitable.

Senate Revenue Bill of Interest to Trade

Revision Permits Manufacturers to Compute the Tax on Wholesale Sales

WASHINGTON, Sept. 19—While the final revision of the House internal revenue bill in the Senate Finance Committee made little change in principle, the new administrative methods proposed in the Senate bill are of particular interest to automobile manufacturers and dealers. The revision of Section 900 of the present law permits manufacturers to compute the tax upon retail sales on the basis of their wholesale selling prices in cases where they are doing both a wholesale and retail business. The House bill which repeals this provision of the present law was approved by the Senate Finance Committee but subsequently under the pressure of complaints from automobile manufacturers and others, it reconsidered and finally made the required change.

Important to Manufacturers

This change is particularly important to manufacturers maintaining branch offices, as the House bill would allow private dealers to sell cars much cheaper than branch establishments, thus making a discrimination.

Because of the recent complaints from the automotive trade, the Senate Finance Committee reconsidered its endorsement of the House bill, changing the language of Section 900, dealing with tires, inner tubes, parts or accessories, and restored the language of the present bill. Dealers and others in the industry contended that the change in the language would allow new interpretations and cause much confusion in the administration of the act.

The Senate Finance Committee also amended a clause in Section 901, in which affiliated corporations may base their taxes on price of sale, instead of purchase price. It is revised so that the price must be the fair market value. This change, if approved by the Senate and the conference, will affect many holding corporations in the automotive trade.

Ford Foreign Output 6140 Cars in August

DETROIT, Sept. 20—A statement from the Ford Motor Co. says foreign plants during August produced 6140 cars, of which 2773 were turned out at the Canadian plant. Buenos Aires made a large increase in output. Total revised output both domestic and foreign for August was 118,100 cars. Kearney assembling plant was a leader in larger output, with Detroit second and Philadelphia third. The total output for four months ended Aug. 31 last was 426,759 cars.

Federal Finances for Export Firms

But Automotive Concerns Have
Made Little Effort to Obtain
Assistance

NEW YORK, Sept. 19—Manufacturers and exporters of automotive equipment have made little effort thus far to obtain assistance from the War Finance Corp. in financing their foreign trade. This corporation, whose powers were recently amended by act of Congress, is the governmental agency which has a lending power of \$1,000,000,000 created for the sole purpose of helping American exporters to build up their overseas business and to supply them with credits that cannot be obtained from banks and other institutions.

Broad Powers

Its broad powers and its specific application to the automotive industries were outlined here to-day by W. G. Bogue, the legal representative of the corporation, which has its offices at Washington. He stated that no reason existed why its financial facilities could not be extended to the automotive industry and that the corporation already had granted large credits to manufacturers of machinery and locomotives. That similar credits could be extended to the automotive industry is the belief of Bogue, and he added that manufacturers who stand in need of such assistance should submit specific proposals either to himself or direct to the corporation at Washington.

"So far as I know," he said, "only two or three efforts have been made by the automotive industries to obtain credit, and we have naturally presumed that they were not in need of such assistance. The first of these efforts was that of an American company which had an order for 50 trucks for a foreign government. Financing was asked for, but the corporation found that the trucks were destined for war purposes and the business was refused, the only reason being that the products were not to be used in peace time pursuits. Otherwise, I am sure the credits would have been granted."

Scope Not Realized

"A second request is now before the corporation; the proposal having originated here last week and having been forwarded by me for final action. This concerns an export order for tires and accessories, and, I hope, will be successful."

Many exporters have believed, without any reason for such belief except newspaper stories, that the corporation would aid only in the financing of agricultural crop shipments. This is in error, as was revealed by a recent announcement of financing offered on sugar machinery and locomotives. The institution was organized and is being used for the aid of all exporters of American products,

either raw or finished, except for war purposes.

The corporation deals directly with the American manufacturer or shipper, and the credits are given to him. This is the opposite of the case with the financing companies organized under the Edge act, which furnish credit to the foreign purchaser. All dealings of the War Finance Corp. are with the American company and credit is extended upon the presentation of negotiable security, the American company, of course, being held responsible for the payment.

Five-Year Credits

Furthermore, the exporters must show that the financing cannot be handled through the customary banking channels. Credits may be extended for as long as five years, although they generally have been for six, nine or twelve months. The longest credit now outstanding is for two years.

"The bulk of our recent financing has been of agricultural commodities," Bogue said. "But it is not the purpose of the corporation and its present activities to slight manufacturers. Exporters should submit specific proposals and, as the activities are being conducted without red tape, they will receive satisfactory and immediate action."

The offices of the corporation are in the Treasury Building at Washington, and all credits are granted from there.

N. A. C. C. Makes Headway on Insurance Reform

NEW YORK, Sept. 19—Considerable progress is being made by the insurance committee of the National Automobile Chamber of Commerce in its negotiations with the leading insurance companies looking toward reduced cost of insurance on motor vehicles. It is felt that only a negligible proportion of underwriting losses can be traced to construction features of the cars and that external causes account for most of them.

Continued thefts of large numbers of cars in certain districts have been reflected in premiums which now have reached an almost prohibitive point. Measures for curtailing these thefts are having the active attention of car makers and underwriters. Rigid enforcement of laws proposed or already enacted, it is believed, would do much to meet this situation.

GOOD MOTORCYCLE MARKET

COLUMBIA, S. C., Sept. 20—Motorcycle companies would seem to have a fertile field in some of the counties of this State, for six of them have not a single motorcycle, according to registration figures compiled by the State Highway Department. The six counties reporting no motorcycles are Bamberg, Barnwell, Calhoun, Jasper, McCormick and York. Another interesting fact brought out in the registration figures is that there was, up to Aug. 31, but one automobile dealer registered in Berkeley County.

Lima, Peru, Takes Up Motor Bus Travel

Converted Ford Trucks Now in
Use—Regular Services Are
Established

LIMA, PERU, August 31 (By Mail)—Motor bus transportation is on the increase in Lima, Peru. In addition to the two large European buses (De Dion-Bouton) with solid tires that were recently put in service between Lima and Miraflores, one of the suburbs, a popular priced light American truck (Ford), with pneumatic tires, has been converted into a bus and is running between Lima and Magdalena, another suburb of the capital. Other and larger trucks have been converted and are running over the same line.

During a recent strike on the inter-urban electric car line, these converted buses did valiant service, working overtime, hauling stranded suburbanites to their homes. Improvised buses, with nothing but planks for seats, resting on the side boards of the trucks, did good business.

Regular Bus Service

A regular bus service has been instituted between the center of Lima and a point on the outskirts of the city, known as Bolognesi Square. The fare is 10 cents Peruvian (less than 5 cents gold), the same as first class fare on a street car. The fare by motor bus from Lima to the suburbs is about twice what it is by electric train line, but up to the present time the buses are doing a good business.

For years Lima has had a public taxi service. There are now more than 500 light cars in this use, and numerous larger cars. The fare for a trip within the city limits is 50 cents.

Motor truck freight transfer has been in practice for some time between Lima and Callao, the port of Lima, a distance of nine or ten miles. In spite of a bad road the trucks are competing with a steam road and mule carts. There are perhaps 225 or more trucks, the majority light trucks, in use in Lima and the immediate surrounding territory.

A possible market for motorcycles is developing in Lima, owing to the fact that the roads between the capital and some of the suburbs have been a little improved. The consumption of gasoline is on the increase in Lima. It is estimated that at least 25 per cent more gasoline will be used in Lima in 1921 than in 1920, though the increased consumption is probably due to the larger number of small cars running.

It is possible that the tariff on automobiles and kindred lines may be lowered. This makes buyers cautious. But should this reduction take place, taken in connection with the fact that cotton, one of Peru's chief exports, is advancing in price, makes the future look encouraging.

Show Managers Plan Promotion Schemes

Enclosed Car "Weeks," Appreciation and A. E. A. "Days" Discussed at Meeting

CHICAGO, Sept. 21—An Enclosed Car Week this fall and special days at the winter shows as agencies of stimulating sales were suggested to the trade by the National Association of Automobile Show and Association Managers, which has been holding a sales promotion meeting here this week.

The show managers, representing a majority of the larger dealer associations throughout the country, met here to exchange ideas and make them available for the trade generally on ways and means of arousing public interest in automobiles throughout the fall and winter, and turning that interest into sales profits for dealers. It was brought out before the meeting was hardly under way that trade associations in six large cities—Kansas City, Detroit, Buffalo, Brooklyn, Syracuse and Rochester—had completed plans for Enclosed Car Weeks in October. Other cities were reported considering the idea and general discussion indicated that quite a large number of "weeks" may be looked for in October and November. The six cities named will have their "weeks" in October.

Special Days Urged

The association recommended to dealer associations and show managers generally that special days be set aside during their winter shows as Appreciation Day and Automotive Equipment Day. Appreciation Day was suggested by E. E. Peake, manager of the Kansas City Motor Car Dealers Association and president of the shows managers' organization. Peake tried out the idea last winter, first appearing before civic organizations and explaining the importance to the city of the automotive industry. His request that these organizations support the show in appreciation of their acknowledgment of the industry's part in the progress of the city resulted in much favorable publicity and in the largest show crowd in Kansas City history on Appreciation Day, which took the place of the former Society Day. Automotive Equipment Day was suggested by Ray W. Sherman, merchandising director of the Automotive Equipment Association, who said that his organization would be able to co-operate with manufacturers, jobbers and dealers in utilizing the day for promotion purposes.

Merchandising Discussed

The association spent the greater part of a day discussing merchandising methods, with the idea of taking home new ideas to their associations and individual dealer members. On this subject they heard addresses by W. Frank McClure, sales promotion director of the

Fort Dearborn National Bank of Chicago and chairman of the national commission of the Associated Advertising Clubs of the World, and G. Raymond Schaeffer, advertising manager of Marshall Field & Co. Both men advocated for mercantile as well as for manufacturing businesses use of institutional and confidence building advertising in addition to more commodity advertising.

Among the larger cities represented at the convention by association managers were: Detroit, Kansas City, Cleveland, Buffalo, Brooklyn, Syracuse, Minneapolis, Newark, St. Louis and Des Moines.

Milwaukee Looks for Gains Through Cuts

MILWAUKEE, WIS., Sept. 21—Milwaukee distributors and dealers look for a sharp accentuation of recent improvement in sales as the result of the general price reductions announced by manufacturers, placing most list prices at or below pre-war figures. Discussing the situation, Tom C. McMillan, head of the Overland Wisconsin Co. and president of the Milwaukee Automotive Dealers Assn., said:

"The whole situation rested with the public, which refused to buy anything except of absolute necessity because of high prices. Manufacturers have long realized this situation and governed themselves accordingly. As the result our industry is resuming a healthy era. It took more than a year to bring it about.

"It is my opinion that where interests have held back from price reductions they will soon be convinced that the buying public has a consistent unwillingness to buy anything except at prices which they think are right. In the automotive industries 'rock bottom' prices have restored buying confidence. A generous increase in sales of Milwaukee dealers in the last two weeks proves this to be true."

Obenberger Forge Will Go On Under Receiver

MILWAUKEE, WIS., Sept. 21—The John Obenberger Forge Co., of Milwaukee, which is going through the bankruptcy courts, will continue to operate as a going concern under the direction of J. Frank Gerdis, trustee, until Oct. 31, according to an order issued by the referee in bankruptcy. The plant was re-opened June 12 on a three months' permit, and creditor banks advanced additional funds to finance production.

At the expiration of the term, Trustee Gerdis requested authority to continue operations until Jan. 12, stating that it would be "disastrous to the interest of the creditors" if the plant was closed now. No new financing is required. The referee, however, granted permission to operate until the close of October, stating that consideration would then be given the matter of future conduct of the company, particularly whether it will continue to operate.

Division of Tests Plans Experiments

First Will Study Widening of Bituminous Surfaces Caused by Truck Traffic

WASHINGTON, Sept. 17—The Division of Tests of the Bureau of Public Roads has under way a number of new investigations at its experimental station at Arlington, Va. One investigation is the study of the shoving or waving of bituminous surfaces caused by truck traffic.

A circular 15-ft. roadway on a 90-ft. radius is being built. The roadway will be composed of a number of sections of various kinds of bituminous pavement. A driverless truck will be guided by a mechanical arrangement in a varying path so as to cover all parts of the surface in the course of its successive trips around the roadway. A study will be made of the resulting effect on the sections of paving.

Another investigation will be made to determine the distribution of pressure through a slab to the subgrade when a load is applied to the surface. Soil pressure cells are being used in experiments with slabs of different thickness and various subgrade materials. At the same time an opportunity is afforded to compare rock fills with concrete slabs. A report is expected about the end of the year.

In connection with experiments to determine the effect of impact on various types of paving, 120 new slabs are being constructed. An investigation has been started to determine the warping effect of weather conditions, mainly temperature, on concrete slabs. Slabs are being placed to study the effect of slab vibration on the capillary movement of moisture in the subgrade.

An autographic strain gage which will probably be known as a strainoscope, has been developed to use in connection with the determination of stresses in bridges and other framed structures subjected to impact. The first instrument has been tried out and found satisfactory. It gives a photographic record of the change in length of any member it is attached to and there seems to be no practical limit to its accuracy. Its special advantage is that it will record the effect of any blow, no matter how quickly it may be delivered.

FEDERAL LABOR REPORT

WASHINGTON, Sept. 19—While there was a slight increase in production of motor vehicles in August as compared with July, the number of workers in 47 automobile factories which report to the Department of Labor, declined from 78,908 in July to 74,283 in August. The pay rolls for these plants fell from \$2,620,015 to \$2,522,602. Per capita earnings for the workers in August increased 2.3 per cent.

G. M. C. Export Models to Be Made in Canada

Includes All Lines With Exception of Cadillac and Truck— Adds Efficiency

NEW YORK, Sept. 19—Manufacture of all export models, with the exception of the Cadillac car and the General Motors truck, will be concentrated by the General Motors Corp. at its Canadian plant at Oshawa, Ontario. It is stated that concentration of such production at a single point will place one executive in charge of all export production, with a better realization of export needs. Its purpose is to produce a line of cars more reliable and more thoroughly tested, which for these reasons will be better fitted for foreign trade. Another purpose is to give greater flexibility to the manufacture of such cars, not only because of changes in the manufacturing program but because of details necessary to meet export needs.

Changes in Personnel

In connection with the concentration of foreign trade manufacturing in Canada, Paul Fitzpatrick, who is now vice-president in charge of operations for the General Motors Export Co., will be transferred from that organization and made assistant to Alfred P. Sloan, Jr., with duties pertaining to the transfer of operations to Oshawa and the study of all problems incident to them.

P. S. Steenstrup, vice-president in charge of sales, will exercise full authority in the export organization, subject to the president, and all personnel heretofore reporting to Fitzpatrick will report to Steenstrup.

Employees Get Notice

A notice sent to all employees of the export company, says:

"In order to make still more effective the operations of the export company, it is desirable to place all functions in one place, and it is believed that all sales work should be as closely adjacent to factory operation as possible. Such a method of procedure eliminates the organization necessary to maintain contact between two offices located at a distance and enables direct dealing and quicker results and, therefore, better service to our customers. For that reason it is considered desirable to remove the export selling organization, as an organization, to Oshawa at the earliest possible moment. It is recognized in carrying out this program that there will be some functions of the export work which it may not be possible to locate in Oshawa. It is impossible in this statement to determine what functions will remain in New York and what will not. Every effort will be made to concentrate all functions in Oshawa that it is possible to concentrate at that point for the very good reason that as long as the move is to be made everything should be in the one place.

"It is recognized that the above change of program is of vital interest, both personally and otherwise, to the various members of the export organization. The management recognizes this and will be very glad to do the best it can at all times to advise the members of the export organization as to how this change of program will affect his or her status. There must be full appreciation on the part of the organization, however, of the fact that these plans are not fully matured in detail, and this early notice is given in order that as little inconvenience as possible may be incurred on the part of the organization in connection with this future program."

Hoover Will Address

N. I. V. A. Annual Meeting

CHICAGO, Sept. 19—Several men of national prominence will address the annual meeting of the National Implement and Vehicle Assn., which will be held at the Congress Hotel here Oct. 12 to 14. The speakers will include Secretary of Commerce Hoover, Secretary of Agriculture Wallace, W. P. G. Harding, governor of the Federal Reserve Board; James R. Howard, president of the American Farm Bureau Federation, and W. W. Atterbury, vice-president of the Pennsylvania Railroad. The vital problems facing business generally and the farm equipment industry in particular will be considered. C. S. Brantingham of the Emerson-Brantingham Co. will speak on "Can Farm Machinery Business Methods Be Better Controlled."

Belsize Motors Defers

Payment of Dividend

LONDON, Sept. 6 (By Mail)—The Belsize Motor Co. of Manchester, one of the best managed and most enterprising plants in Great Britain, has decided to defer payment of a dividend on its preferred stock although the earnings have been sufficient to more than cover the amount needed. An interim dividend of 4 per cent was paid in May and it had been intended to declare another payment for the half year ending this month, but it was deemed wiser to husband resources.

The company has been in production since 1912 on a light model which sold for \$900 complete, and it has enjoyed a much better business than most of its rivals. A new light car will be produced next season with a two cylinder diagonal oil and air cooled engine as well as other more or less novel features designed by Granville Bradshaw.

TAX RECEIPTS ANNOUNCED

OLYMPIA, WASH., Sept. 21—Completion of the first monthly report of receipts by the State from the liquid fuel tax, or so-called gasoline tax, which became effective July 1, was announced this week by the department of licenses, showing 8,628,192.7 gal. of liquid fuel sold during the month.

Ten More States Add Gas Tax to Revenues

Returns in Fourteen States Will Add at Least \$6,000,000, Report Says

NEW YORK, Sept. 19—Ten new States, bringing the total to 14, added taxes on gasoline consumption to their revenues at the 1921 sessions of their legislature. A report on this subject, compiled by Harry Meixell, secretary of the Motor Vehicle Conference Committee, shows that this action will add at least \$6,000,000 to the taxes paid by motor vehicle users.

When the present year began, the four States which had a gasoline tax were Colorado, Kentucky, New Mexico and Oregon. The States which added the tax this year were Arizona, Arkansas, Connecticut, Florida, Georgia, Montana, North Carolina, Pennsylvania, South Dakota and Washington. The tax is one cent a gallon in all States except New Mexico where it is two cents.

The chief objection to the imposition of a gasoline tax is that it is discriminatory and adds another impost to the "stigma taxes" which have been inflicted on the industry. The tax also discriminates against motor vehicles propelled by internal combustion engines in favor of those driven by steam or electricity. It is probable that agitation over a gasoline tax will be taken up in several other states at the coming sessions of their legislature.

Indiana Truck Owners

Caught in License Net

INDIANAPOLIS, IND., Sept. 21—Following a ruling in court here recently in which the Indiana motor vehicle law was held constitutional, the prosecutor of Marion County is demanding that 200 defendants failing to obtain State license for trucks be adjudged guilty. He says that about 200 truck owners who did not take out State truck licenses were awaiting the outcome of the recent decision.

William P. Frye, the defendant in the test case, is the proprietor of the William P. Frye Transfer Co., and at the time he was ruled against he was given thirty days in which to file an appeal. Several days in which to perfect an appeal have passed, but it has not been filed. The county prosecutor is demanding action on the 200 other defendants.

BRITISH PIONEER DIES

LONDON, Sept. 5 (By Mail)—C. Vernon Pugh, managing director of the Rudge Whitworth Co., Coventry, and also director of the Lanchester Motor Car Co., Birmingham, and the Rudge Whitworth Wire Wheel Co., died unexpectedly last week while on a brief holiday. Pugh was the foremost advocate in Britain of the wire wheel for cars.

Metropolitan S.A.E. Discusses Fuel

Papers Read at Summer Meeting of Society Are Reviewed

NEW YORK, Sept. 21—A review of the fuel paper read at the Society of Automotive Engineers' summer meeting was presented by H. L. Horning at the first meeting of the Metropolitan Section held this season at the Automobile Club of America.

Horning passed by the Dorris manifold paper with the remark that Dorris in the device described by him had produced a remarkable piece of apparatus. He had driven a Dorris car fitted with it on and knew that it gave excellent results. He then turned to the paper of Dr. James and commended it highly. He drew attention to the fact that the loss in the gear box and rear axle due to the use of heavy lubricants is surprisingly high, as one will find by filling the transmission case and axle with heavy lubricants and noting how sluggish the car is in coasting. We should not, he said, overlook the advantage of the soft cord tire, for such tires may add 15 per cent to the mileage of the car.

Air Cycle Efficiency

The term air cycle efficiency was discussed and its values for different compression ratios were given. It was explained that this is an ideal efficiency and is never obtained in practice, one reason being that the specific heats of the gases of combustion increased at high temperatures, causing a loss of about 15 per cent, and another that at high temperatures there is a loss of about 13.5 per cent due to direct radiation. There is also a loss of about 1 per cent due to the fact that the gases do not burn instantaneously but have to be ignited a moment before reaching the dead center and kept on burning for some time after the piston starts on the down stroke, so that the pressure in the combustion chamber does not reach the full value that might otherwise be expected. There is a further loss of about 2 per cent due to the lead given to the exhaust valve opening.

This leaves 68.5 per cent, which is approximately the relative efficiency obtained in a good engine. The relative efficiency had a tendency to go up with the compression ratio, displacement, rotational speed and load. The volumetric efficiency is affected by the inlet temperature, design of passages, character of fuel and the timing.

Crane Opens Discussion

H. M. Crane, who opened the discussion, said that he has recently been using the overhead valve type of engine because the compression chamber of such an engine is easiest to machine and easiest to clean. He has found, however, that, owing to the absence of turbulence

in the flat cylindrical combustion chamber, it is necessary to give the ignition an advance of 65 deg. in order to obtain the maximum power, but by the use of two-point ignition it has been found possible to reduce the required ignition advance to 35 deg. There is also much trouble at idling speeds. In fact, on very small throttle openings the engine in question could be kept running only by using two-point ignition or by increasing the richness of the mixture from 15 to 20 per cent. On the other hand, the combustion chamber forming substantially an extension of the cylinder bore, has less flame-swept area, and a higher compression ratio can be used. Two point ignition also results in much better pick-up of the engine. By providing four spark plug bosses per cylinder and trying the plugs in various positions it was possible to find the best locations.

Depends on Cylinder

Crane said that in his engine he depends largely upon the cylinder for the vaporization of the fuel, as in the cylinder all the factors required for this process—the area, the temperature and the time—are present. This latter statement was taken exception to by W. P. Deppe, who said that in order to insure homogeneity of the gaseous charge in the combustion chamber, vaporization of the fuel must take place before the fuel entered the cylinder.

S. A. E. Members to Make Trip to Proving Grounds

NEW YORK, Sept. 17—Arrangements have been completed for the trip of members of the S. A. E. to the Aberdeen Proving Grounds on Oct. 7, and an announcement concerning it was made at the Metropolitan Section meeting on Thursday last. A B. & O. train will leave the Pennsylvania depot in New York at midnight and will arrive at Aberdeen about 9 o'clock next morning. The use of a motor omnibus had been offered to the society for the use of members who might wish to go by road. The plan was to leave S. A. E. headquarters about 10 o'clock in the morning on the 6th and make the entire trip down to Aberdeen, as well as the return journey, by bus. However, since this would take three business days instead of one, there did not seem to be much interest in the proposition, and it was dropped. An alternative plan is to go down to Wilmington in the afternoon or evening of the 6th and stay there over night.

CHINA PLANS FIRST SHOW

SHANGHAI, CHINA, Aug. 31 (*By Mail*)—China's first automobile show will be held in Shanghai in November. The show will become an annual event and great preparations have been in progress to make it one of the most striking demonstrations the Republic has known. The good roads movement in China is actively supporting the show.

Ford Business Good in Des Moines Field

One Dealer Reports August Biggest Month—Accessory Sales Fall Off

DES MOINES, IOWA, Sept. 21—The Herring Motor Co., long established Ford dealers, report that the month of August, in so far as car sales was concerned, was the largest that company has ever known. Another Ford dealer reports sales of 144 cars in Des Moines during the month.

Other dealers, while they report business has held up to a point even with or above the expectations, admit that many of them will do well if they "stick it out" through the winter.

The unusual Ford business referred to cannot be entirely attributed to price cut stimulation, as the last Ford cut did not come until late in August. Ford business seems to be better in Des Moines than it is in some other cities in Iowa, and this may be accounted for partially by the fact that Des Moines has been without street car service since Aug. 3. It is also admitted by dealers that many prospective buyers who in normal times would buy higher priced cars want transportation, and are therefore buying Fords.

Business Stimulated

There is little question but that price cuts have served to stimulate business among all dealers. A dealer who sells one of the higher priced cars advised the writer that prospects for a fairly good enclosed car business during the fall were good.

There is no improvement in the condition of the business among farmers, and dealers do not anticipate any until freight rates come down and the retailer takes a greater portion of his losses.

C. L. Herring of the Herring Motor Co. stated that the accessory business during the past sixty days had not held up to the car business. Repairmen and garagemen report the biggest business in their history, which is taken to mean that car owners are making major repairs with the idea of making cars go the full limit.

ELECTRIC TRUCKS AT SHOW

NEW YORK, Sept. 19—Displays of electric trucks will feature the electrical show which will be held at the 71st Regiment Armory beginning Sept. 28. Figures compiled by the managers of the exposition show that nearly 800 electrically driven trucks have been sold in the boroughs of Manhattan and Bronx in the last three years. The total in operation in the two boroughs at the beginning of the year was 3142, and there were 4362 in the metropolitan district which had been in operation for a year or more. Wholesale and retail bakers lead in the number of trucks operated with 485.

Depression Holds Up Trade in Far East

Returned Paige Representative
Says General Business Must
First Pick Up

DETROIT, Sept. 16—Revival of automotive business in Australia and the Far East is dependent entirely upon the revival of general business in that part of the world, and revival of general business there means a renewal of its commercial intercourse with the United States and the great industrial nations of the world.

To Alfred B. Peacock, representative of the Paige Motor Car Co. in that territory, there can only be prosperity in those countries of limited sources of wealth when the rest of the world resumes its normal stride. With a demand for their products, these countries will be in a position to buy not only automobiles but all sorts of merchandise. Without an opportunity to sell they will not be able to buy.

Brings Home Report

Peacock is back in the United States after a prolonged absence in these countries, to study new automotive ideas for adaptation there. He is optimistic of the possibilities for business in those countries after reviewing conditions intimately here, and looks for a steadily increasing business after the first of the year.

There should be good business in the Antipodes and the Far East, he declared, for American cars ranging up to what is the middle priced car class here. For trucks and tractors, the Australian market is limited, owing to the excellence of the draught horses bred in that country and owing to the high operating costs of motor driven vehicles, as compared to the low costs of keeping horses.

American passenger cars have a good hold upon the regard of Australian car buyers, owing to low operating costs and fuel economies, though there are a number of British and Italian cars of low horsepower in use in the cities. As a general rule, however, Peacock said, the more powerful and more economical American car finds great favor.

Fuel Costs High

Fuel costs are extremely high in Australia, there being no production of oil on the continent itself, and the fields of Borneo and the Dutch East Indies being several weeks away by steamer. Explorations for oil are now under way in many parts of the continent, but as yet there have been no strikes in quantities to warrant commercial exploitation.

Servicing of cars is about on a par with service in the United States, manufacturers requiring that ample stocks be carried to insure owners continuous use. Dealers maintain adequate stations, and most of the farmer owners are mechanics enough to make repairs and parts replacements as required.

Manufacture of parts for cars is carried on to a considerable extent in Australian machine shops. There are also a number of tire producers who are finding much favor with local buyers. Two makes of cars are being assembled in Australia entirely of American units, both of these being just introduced and finding favor because of the desire to promulgate home industries.

Body manufacture is carried on to a high degree of perfection throughout the entire territory, Peacock asserted. Japanese body makers and Australian artisans vie with the best of American builders in this work. Japan is an especially good market for enclosed body sales, owing to the severe winters and dusty summers. In India there is much custom built body work, but in India's case, only the finishing touches are given the work by native artisans, the body building being done by the car maker before shipping.

Cord Tire Is Becoming More Popular Abroad

WASHINGTON, Sept. 19—Statistics furnished the Bureau of Foreign and Domestic Commerce by R. L. Palmerton, chief of the rubber division, show that the cord tire is becoming increasingly popular with European owners. According to the reports of 63 tire manufacturers there were exported in this country during July, 48,840 automobile casings and 46,322 inner tubes.

Palmerton says that in the larger and straight-side sizes the popularity of the cord tire has increased until its sales surpass those of the fabric, while in the small sizes and clincher type the fabric tire is still supreme. It is also interesting to note that there were exported during the month four clincher cord tires, size 37 by 5; four clincher fabric tires, size 32 by 4; four clincher fabric tires, size 33 by 4; and two clincher fabric tires, size 33 by 4½.

Of the 48,880 casings, representing all sizes, types, and constructions, 10,469 casings, or 21.4 per cent, were of the inch-size cord construction; 24,652, or 50.4 per cent, were of the inch-size fabric construction; and 13,759, or 28.2 per cent, were in clincher-type millimeter sizes, this latter class not divided as to cord and fabric. The principal interest to be found in the figures is the disclosure of the export demand as to sizes.

THOMAS GETS SPEED RECORD

PARIS, Sept. 19 (By Cable)—An average speed of 72 miles an hour was made by Rene Thomas driving a Talbot-Darracq in winning the race at LeMans for cars equipped with engines not exceeding 91 cu. in. piston displacement. This speed established a new world's record for cars of that class. Guinness was second in the race and Segrave third, both driving Talbot-Darracqs.

The race for cycle cars with engines of 67 cu. in. piston displacement was won by Lombard with a four-cylinder Salmson, who averaged 54.7 miles.

Automotive Trade Leads Retail Line

Ohio Bankers Say It Is in Better
Shape Than Any Other
Due to Prices

CLEVELAND, Sept. 20—The retail automobile business here is in better shape than is any other retail line, according to expressions heard at the annual meeting of Group 9 of the American Bankers Assn., which was held last week at Chippewa Falls.

Bankers throughout the northern tier of Ohio counties attended the gathering, and all practically reported that the retail automobile dealer was giving less trouble with financing demands than the other lines of merchandising. Trade is brisker with automobile dealers than it is with the average retail merchant in other lines, according to reports from this city, Akron, Ashtabula, Sandusky and Lorain.

Price Reductions a Favorable Factor

The large reductions that were made in the prices of all makes of cars were said to be responsible largely for the condition in the trade and credit also was given for smart advertising and keen merchandising methods. Bankers were urged to do what they can to continue reductions in the prices for material and labor, and also to encourage buying. This appeal was made by H. K. Ferguson, of the H. K. Ferguson Co. of this city. F. C. VanCleaf, of the B. F. Goodrich Co., Akron, said that while the rubber industry has experienced its share of trouble, yet it has not gone through an experience more trying than has the average industry. Tire sales the first seven months of the present year were an annual 5,000,000 unit basis as compared to 33,000,000 units in 1920. On July 31, the industry had less than one and a half months' supply on hand, while consumption was going on undiminished. Railroads have been light purchasers of belts and hose and the mechanical goods department has been very quiet. The rubber boot and shoe business is prepared for a severe winter following the mild one of last year.

In the steel industry, W. E. Manning of the Youngstown Sheet & Tube Co. said that production reached its low ebb last July and that since then there has been a slight increase on account of buying to meet actual needs.

RECEIVER FOR HINKLEY

DETROIT, Sept. 22—An involuntary petition in bankruptcy has been filed by creditors against the Hinkley Motors Corp., and the Security Trust Co. has been appointed receiver. Acts of bankruptcy are alleged in the payment of several creditors' claims while insolvent. The liabilities are said to total approximately \$1,500,000 while the fixed assets amount to less than \$1,000,000. The company has many unfilled orders on its books.

Back to Normal Plan Offered by Reeves

N. A. C. C. Official Suggests "Readjustment Week" Followed by a "Buying Week"

NEW YORK, Sept. 19—Contributing to a symposium in which the views of representatives of various industries are given, a novel proposal for hastening the return of business to normal is made by Alfred Reeves, general manager of the National Automobile Chamber of Commerce.

"People must be convinced that prices have been stabilized," says Reeves. "Why could not we have a great 'readjustment week' when everyone would readjust prices, to be followed by a great 'buying week' that would tend to speed up the wheels of commerce?"

"The Administration at Washington is, I believe, doing everything possible to bring about these readjustments in orderly fashion. You cannot legislate yourself into heaven, however, and the country's situation was so bad that even so great a leadership and so great an array of men as we have at Washington at the present time cannot bring the readjustment except at a slow and orderly rate.

"Let us have faith in our Washington officials until they prove unworthy.

"Let us take a greater interest in our local municipal affairs, where much trouble is brewing because of extravagances.

"Let us have that abiding faith in the future of America that has always been the keystone of our progress, and, above all, let us work."

Referring to taxation, Reeves says:

"Instead of looking for new sources of revenue, there is a general feeling that we should find new sources of economy."

On the subject of tariff, his view, which is that of the automotive industry, is:

"Let us have a tariff that will produce a fair revenue, but not one that will simply place the burden of the increase on the American public. This country with great productive capacity needs trade. We must expect to buy from foreign countries if we plan to sell to them."

Corn Prices Expected to Aid Fall Business

DECATUR, ILL., Sept. 21—Better corn prices will mean 100 per cent increase in the automobile business, according to one Decatur dealer, who added that he had four prospects on his list ready to buy when corn hits 50 cents.

Dealers throughout this territory agree that prospects for winter business are bright. "We have learned that we must earn every order we get," explained another, "but people are buying once more. Never have we had such a bunch of live prospects."

A third summed up the outlook: "Cars are fairly easy to get and we can handle all the business coming in. As might be expected, sedans are most popular jobs now and the person ready to buy a car can usually get the difference between an open car and a closed one."

UNEMPLOYMENT CONFERENCE WILL INCLUDE ONLY ONE AUTOMOBILE MAN

WASHINGTON, Sept. 19—Only one man directly connected with the automobile industry has been selected by the President as a member of the unemployment conference which will be held here beginning Monday next. James Couzens, mayor of Detroit and vice-president of the Ford Motor Car Co., has been named as a representative of the city and of the automobile industry. An effort will be made by the automobile trade and highway officials to show that the resumption of highway construction would alleviate unemployment conditions and at the same time improve the transportation facilities of the United States. It is hoped that Couzens and others interested in the automobile industry will keep this subject before the conference.

Passenger Car Sales Show Drop in New York

NEW YORK, Sept. 21—New passenger cars numbering 4566 were sold in August in 10 counties in and around New York, as compared to 5843 in July. The August sales included 4216 in the class approximately below \$2,500 and 350 in the class above that price. For the eight months ending Sept. 1, the total registrations were 34,991.

Registrations, equivalent to sales, in the 10 counties, month by month throughout the year, were:

	Approximately below \$2,500	Approximately above \$2,500	Total
January	483	146	629
February	1,409	210	1,619
March	3,396	488	3,884
April	4,811	575	5,382
May	5,468	584	6,052
June	6,522	490	7,012
July	5,457	386	5,843
August	4,216	350	4,566

(The registrations compiled by Sherlock and Arnold of New York cover all of New York City and five counties outside).

Moreland Truck Resumes on Limited Schedule

SAN FRANCISCO, CAL., Sept. 21—The Moreland Motor Truck Co. has resumed manufacturing on a limited schedule at its plant here, which has been closed for some weeks. This plant was one of the last of the truck manufacturing plants of the country to suspend and is one of the first to resume. The stock of trucks completed when the factory suspended has been practically sold out, and manufacture will be held at the amount of sales for some time to come, according to Watt L. Moreland, vice-president and general manager of the company.

Resignations Do Not Affect Hares Motors

Company Will Continue to Offer to Trade Complete Line of Trucks

NEW YORK, Sept. 20—Although Emlin S. Hare has resigned as president of the Kelly-Springfield Motor Truck Co., and the other representatives of Hares Motors who were officers of the truck company have resigned, the two corporations have renewed their relations in the sales field and Hares Motors will continue to offer a complete line of trucks ranging from 1½ tons to 6 tons capacity, with a wide selection of wheel bases, frame lengths and gear ratios. Charles Willard Young of Emerson McMillin Co. has been elected president of the truck company to succeed Hare.

Edward O. McDonnell of this city, who has been appointed general manager of the Kelly-Springfield plant at Springfield, Ohio, is a graduate of Annapolis and during the World War served as personal representative of Admiral Sims in procuring the material and personnel for the North Sea mine laying project which involved an expenditure of \$40,000,000 for material.

A statement by Hares Motors in reference to its future plans, states that abrogation of the Locomobile and Mercer contracts will not interfere in any way with its original plans, which call for the production and marketing of passenger cars to sell for \$1,700, \$2,500 and \$4,500.

Hares Motors of New England has taken over the distribution of the Saxon car, but no arrangements have been made for handling this line in other sections of the country.

Heavy Registrations Expected in Columbus

COLUMBUS, OHIO, Sept. 21—Stimulated by the general reduction in prices and also by the Atwood law, which requires the registration of bills of sale on all used cars, when ownership is changed, registration with the Ohio Automobile Department so far this year has been far in excess of the totals for 1920.

Up to Sept. 15 of this year the department registered in excess of 604,000 gasoline passenger cars, 4000 electrics, 97,000 trucks and 3700 dealers and manufacturers. The total registration in the various classifications in 1920 were: Gasoline passenger cars, 533,000; electrics, 4000; trucks, 83,000; dealers and manufacturers, 3700. Thus there is a big increase in the number of gasoline passenger cars and in trucks.

It is predicted by Registrar W. A. Snow that there will be about 617,000 gasoline passenger cars registered in 1921.

Receivers Appointed for Accessories Firm

Assets of Former Times Square Auto Supply Co. in Excess of Liabilities

NEW YORK, Sept. 21—D. W. Kahn, of 120 Broadway, Robert B. Baird and A. J. Cohen have been appointed receivers under a bond of \$50,000 by United States Judge Charles M. Hough for the Consolidated Distributors, Inc., in an equity proceeding.

The company operates 39 different stores for the distribution of automobile accessories and has its main office in Long Island City. The petition was filed by Chester D. Ireland, of Ridgewood, N. J., who alleges claims of \$24,000. The petition states that liabilities approximate \$2,500,000 with assets in the neighborhood of \$3,500,000.

At its incorporation, the Consolidated Distributors, Inc., acquired the business of the Times Square Automobile Co. of New York, Pennsylvania and Missouri. It has an authorized capital of 300,000 shares of common without par value, and for the year ended Dec. 31, last, its net sales aggregated approximately \$5,456,000. Its balance sheet as of Dec. 31, last, showed inventories of \$4,178,000 and notes and accounts payable of approximately \$1,828,000.

Consolidated Distributors was incorporated in New York in September, 1916, as the Times Square Auto Supply Co. and the present name was adopted in March of this year. Included among the companies it took over was the Times Square Automobile Co. of New York, a Missouri corporation which in March of 1916 acquired the automobile supply and accessory business of Froelich, Mansbach & Froelich, which was engaged in the wholesale and retail distribution of accessories. When the name was changed this year the company separated its wholesale from its retail business. The wholesale business for the Eastern States is located in Long Island City, where the company has a plant. There also are wholesale plants in Los Angeles and San Francisco.

The Times Square Auto Supply Co. of New Jersey conducts the retail business. Stores are located in New York, Philadelphia, Pittsburgh, Chicago, Minneapolis, Kansas City, Cincinnati, Columbus, Des Moines, Milwaukee, San Francisco, Brooklyn, Baltimore and Yonkers. The New York salesrooms are located in three steel and concrete buildings erected by the company at Broadway and 56th Street on land leased for 21 years with option for renewal for 21 years.

The Consolidated Distributors has an authorized common stock capital of 300,000 shares of no par value of which 190,396 shares are outstanding. An issue of 7 per cent cumulative preferred stock previously outstanding was redeemed in July, 1920. Dividends on the preferred were paid regularly until it was re-

deemed. Dividends on the common began in April, 1920, and were paid regularly until April of 1921, when the dividend was passed, although the dividend paid Jan. 27 of this year was in scrip.

The general balance sheet as of Dec. 31, 1920, showed assets of \$6,628,347. The working capital at that time included: Cash, \$211,010; notes receivable, \$17,211; accounts receivable, \$861,485; inventories, \$4,178,605. Notes payable were listed at \$1,577,880 and accounts payable at \$250,871.

William H. Durval of this city is chairman of the board and Jesse Froelich is president. The directors, besides these two, are H. A. Weatherbee, C. D. Ireland, C. Stanley Mitchell, G. A. Graham, Darwin A. James and O. R. McDonald of New York and Will A. Innes of Los Angeles.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Sept. 21—The trend of the money market was toward still easier money last week, while renewal rates for call money stood around 5 per cent new loans were made at as low as 4½ per cent. Time money was offered at 5 per cent for 30-day maturities, with a nominal quotation of 5½ per cent for 30-, 60- and 90-day maturities, while 4, 5 and 6 months' maturities were quoted at 5½ per cent against a range of 5¼ to 6 per cent the previous week. These quotations were surprising in view of the large mid-month financial operations of the Treasury. The commercial paper market was quite featureless with rates of 6 per cent for prime bills and 6¼ per cent for secondary names for all maturities up to six months.

"The New York Reserve Bank announced a reduction in its rediscount rate from 5½ per cent to 5 per cent on Sept. 21."

The large amount of money seeking highly liquid investment was evidenced by the subscription of \$1,587,838,900 to the recent Treasury offering of about \$600,000,000 combined of 3-year 5½ per cent notes, 1-year 5¼ per cent certificates of indebtedness, and 6 months' 5 per cent certificates. \$698,149,100 were allotted, leaving \$889,689,800 which did not secure investment. The offerings and allotments were as follows: To the 3-year 5½ per cent notes \$785,082,900 were subscribed and \$390,706,100 allotted; to the 1-year 5¼ per cent certificates of indebtedness \$339,938,000 were subscribed and \$124,572,000 allotted; to the 6 months' 5 per cent certificates \$462,818,000 were subscribed and \$182,871,000 allotted. By offering current interest rates and an easy method of subscription, the Treasury has built up an excellent market for its floating and short-term debt, with a result that Secretary Mellon's plan for spreading the nearby maturities of Government obligations over the period ending in 1928, is making rapid progress.

Motor Wheel Plans Merging of Units

Push Arrangements for New Building—Company Expects to Extend Operations

DETROIT, Sept. 21—The Motor Wheel Corp. at Lansing will push forward at once new building plans which will permit consolidation of units and place the company in a position to extend its operations. Although business for the next few months is expected to slow down somewhat, officials are convinced that a revival is inevitable with the turn of the year.

In addition to the operations at Lansing, the company will erect several new buildings and increase its railroad facilities at the woodworking plants in Memphis. The original plans of the company had fixed the new construction and consolidation programs for 1922, but the addition of new business in the past 60 days, coupled with the desire to provide assistance in employing men during the fall and winter, prompted the decision to proceed with this work at once.

Among the construction details are a new rim plant to take care of contemplated increase requiring additional steel rim and steel felloe output. This will be in operation before the first of the year. The hub shops of Prudden and automobile wheel plants will be consolidated into a modern hub machine shop of greatly increased capacity. The main office of the company at the Prudden factory will be doubled in size and all the Lansing offices will be consolidated there.

Durant to Use Ansted Engines in New "Six"

NEW YORK, Sept. 20—Announcement is made by Durant Motors, Inc., that the Ansted motor, manufactured by the Ansted Engineering Co. of Connersville, Ind., has been adopted for use in the Durant six cylinder car, formerly the Sheridan, which will be placed on the market about Nov. 1. A contract has been placed for the manufacture of a large number of these motors.

Although the Ansted Engineering Co. is controlled by the United States Automotive Corp., which also is the holding company for the Lexington Motor Co., the Connersville Foundry Corp. and the Teetor-Hartley Motor Corp., it is stated at Durant headquarters that no significance was to be attached to the use of the Ansted motor in the Durant car beyond the belief by Durant that it is the best motor of its kind available. The motor designed by Durant engineers for use in his four cylinder car will continue to be made by the Continental Motors Corp. Experimental work on the redesigned Sheridan, which will be transformed into the Durant Six, is still under way at the Long Island City plant.

Unit Parts Makers Revising Prices

Want to Cut Cost of Assembled Vehicles

Believe Reductions Will Stabilize Car and Truck Sales and Equalize Competition

DETROIT, Sept. 20—Important price revisions by some of the leading unit parts makers, announced to the industry in the past week and effective almost immediately, are expected to place the assembled car and truck business upon the firmest price foundation that it has known since 1917.

In the opinion of the unit makers, their concessions will be followed at once by reductions in the prices of assembled cars and trucks, and the prices so announced will be stabilized for a long time to come. Car and truck makers whose present prices have anticipated the new concessions, will show a smaller reduction than in the case of products which have awaited definite action by the parts makers, but it is regarded as certain that there will be general revisions all along the line.

There is a feeling that the reductions in the assembled products will bring, at least temporarily, an era of competition between the all-factory built and the assembled product, which will bring the industry as a whole immediately to a point where hesitancy in buying on the part of the public will be eradicated as a factor in withholding business.

In announcing the price revisions to the trade, the parts makers are doing so with the knowledge that comparison with the basis of prices in 1917 will show not only that they have again reached that level, but in many instances are actually below them. In return, the revision of prices by the assemblers is expected to show the buying public a similar favorable comparison, and restore buying confidence.

In fixing their new price schedules, the parts makers have based them entirely upon present day material and labor prices, and a production cost determined as accurately as possible on business which the reductions should bring about. The new prices will mean further heavy inventory losses, but these will be taken as necessary to restore confidence to the buying public.

It has been taken for granted that a considerable time must elapse before sufficient business will have resulted to compensate for the inventory losses. Getting past this time will be the period of greatest trial for the industry. With it safely passed, a firm business footing will have been established, and that is the aim of the movement.

Exports of Automobiles, Airplanes, Trucks, Farm Tractors, Motorcycles and Parts for August and Seven Previous Months

	Month of August		8 Months Ending August	
	1920	1921	1920	1921
	No.	Value	No.	Value
Airplanes	5	\$47,165	41	\$381,204
Airplane parts.....		\$2,120		15,005
Commercial cars.....	2,034	3,375,263	381	434,052
Motorcycles	1,365	397,221	215	60,146
Passenger cars.....	11,154	13,789,684	2,237	2,265,328
Parts, not including engines and tires.....		6,115,945		1,786,886
				55,114,920
				28,555,593

ENGINES

	Month of August		8 Months Ending August	
	1920	1921	1920	1921
	No.	Value	No.	Value
Automobile, gas.....	2,067	\$327,142	226	\$60,999
Marine, gas.....	505	162,746	171	47,600
Stationary, gas.....	2,158	511,701	435	104,147
Tractor, gas.....	1,497	1,122,940	2	7,930
Total.....	6,227	\$2,124,529	834	\$220,670
				69,059
				\$24,834,497
				19,586
				\$7,587,385

Automotive Exports Show Slight Gains

Increases Shown in Passenger and Commercial Cars and Airplane Parts

WASHINGTON, Sept. 20—Statistics of automotive exports for August, compiled by the Bureau of Foreign and Domestic Commerce to-day, show a slight increase in the value of passenger and commercial cars and airplane parts, as compared with the previous month. This gain is more than offset, however, by declines in other automotive commodities offered for export. The figures show that exports of automotive products were from two to eight times greater during August, 1920, than for the same period this year. A smaller ratio obtains on the total exports for the eight months ending in August.

Though the number of trucks has declined 18, the value of commercial cars exported during August was \$119,815 greater than the previous month. Exports of passenger cars increased by only 14 during August, but the value exceeded that for July by \$381,960. The notable increase was in the value of airplane parts, the gain amounting to \$12,561 for August, 1921, as compared with the previous month.

Shipment of parts, not including engines and tires, fell off approximately \$200,000 during August. Compared with August, 1920, the decline amounted

to \$4,329,059, and the value for the eight months' period ending August, 1921, was about half the amount for the same period last year.

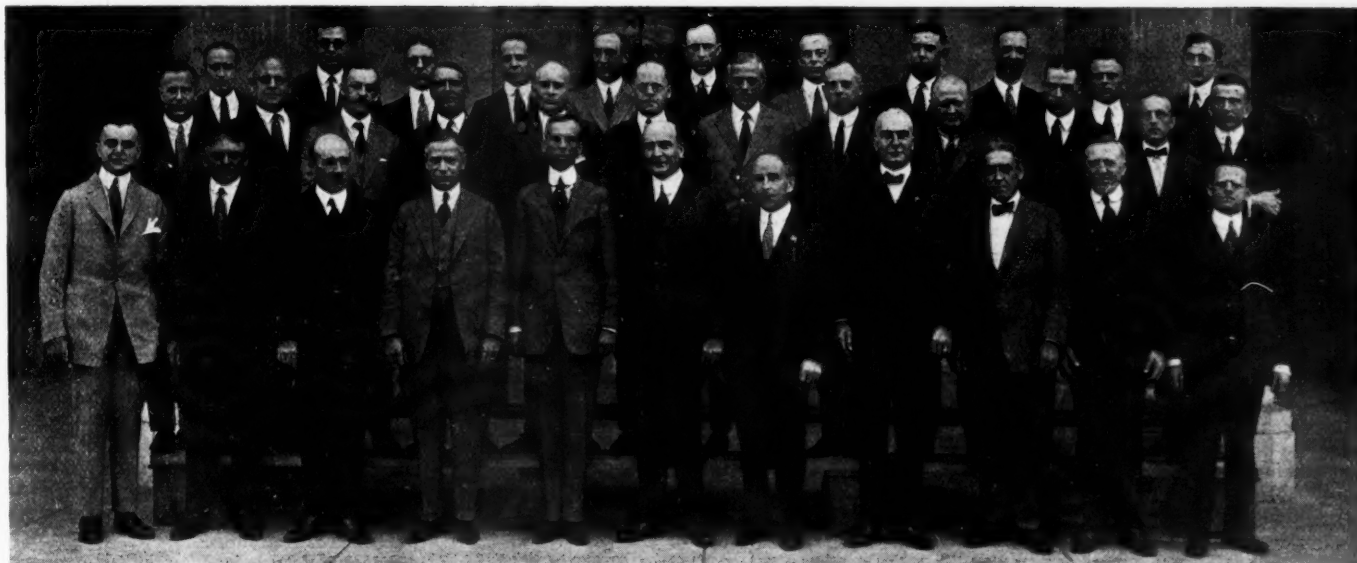
There has been a marked decline in the volume of tractor engines exported, as the shipments for August of this year amounted to two, as compared with 1497 engines valued at \$1,122,940, for August, 1920. The number of gasoline engines exported during August, 1920, amounted to 834, with a value of \$220,670, as against 6227 engines and a value of \$2,124,529 for the same month last year.

Lincoln Business Better Than Any Previous Month

DETROIT, Sept. 22—President H. M. Leland of the Lincoln Motor Car Co. told his dealers who had assembled here this week for a sales conference, that the company had definitely turned the corner and that its business now was at a higher mark than at any time heretofore. He predicted that general business conditions would brighten in the near future.

R. C. Getsing, general sales manager, said that September business was running far ahead of any previous month. Ninety cars were shipped in the first week, which was a record, and it is expected the total for the month will reach 400. October is expected to exceed September. The company is behind in deliveries of certain models.

An unusual condition reflected in the sales was the growth of business in the South because of increased popularity of the high priced cars in that section.



General Motors Executives at Detroit Conference

Lower Row: Lawrence P. Fisher and Fred J. Fisher, Fisher Body Co.; G. W. McLaughlin, General Motors of Canada Group, Oshawa, Ontario; K. W. Zimmerschied, Chevrolet Motor Co.; A. P. Sloan, Jr., vice-president; P. S. du Pont, president; J. J. Raskob, vice-president; C. S. Mott, chief of advisory staff, General Motors Corp.; H. H. Rice, president Cadillac Motor Car Co.; J. A. Craig, Samson Tractor Co., Janesville, Wis.; J. H. Newmark, advisory staff

Middle Row: J. H. Beaton, McLaughlin Motor Co.; Ross MacKinnon, General Motors Co. of Canada; J. W. Wheeler, General Motors Export Co.; C. J. Nephier, Oakland Motor Car Co.; H. M. Craig, Samson Tractor Co.; E. M. Young, advisory staff; Norval A. Hawkins, director of sales, advertising and service, advisory staff; L. McNaughton, Cadillac Motor Car Co.; H. T. Hickey, advisory staff; V. H. Day, General Motors Truck Co., Pontiac; L. R. Beardslee, New York office; H. G. Weaver, advisory staff

Top Row: R. B. Kayser, Chevrolet Motor Co.; A. L. Deane, General Motors Acceptance Corp.; L. D. Haas, Scripps-Booth Corp.; J. T. Ardis, New York office; T. S. Merrill, secretary, General Motors Corp.; C. E. McTavish, General Motors of Canada; E. T. Strong, Buick Motor Co., Flint; G. H. Peasley, Olds Motor Works, Lansing; R. D. Kerby, Olds Motor Works of Canada; J. H. Voorhees and F. G. Eastman, advisory staff

Two G.M.C. Meetings a Month in Detroit

Executives Will Confer to Perfect Close Contact on General Policies

DETROIT, Sept. 17—To bring the units of the General Motors Corp. into the closest possible contact on general policies, meetings of the executive committee will be held twice monthly at the big G. M. C. Building here, with either President Pierre S. du Pont or one of the executive vice-presidents, presiding.

Attending each of these executive committee meetings will be executives of the particular units whose operations are affected by discussions set for the particular meeting. Executives not attending will be apprised of developments by personal letter and code message. Members of the advisory staff, which operates under the executive committee as the contact point for all units, will attend each meeting.

The operations committee of the corporation, which comprises the manufacturing executives of all units and the executive officers of the corporation, will meet monthly. Complete details of operations, sales and general policies of the many units have been practically definitely worked out at the meetings held to this time and are being made effective at once.

On the occasion of the meetings held here this week a dinner was tendered President du Pont and visiting executives by the advisory staff.

MUTUAL CREDITORS MEET

SULLIVAN, IND., Sept. 21—A resolution adopted at a meeting of the creditors of the Mutual Truck Co., against which receivership proceedings recently were instituted, indicates that common stock in the corporation may be accepted by creditors in the payment of claims. If the property of the company is disposed of at a forced sale, the creditors will receive less than 10 cents on the dollar.

SHOW DRAWING OCT. 6

NEW YORK, Sept. 21—The annual members' meeting of the National Automobile Chamber of Commerce, at which space is drawn for the New York and Chicago shows, will be held at headquarters in this city Oct. 6. Prior to the luncheon which will precede the space drawing, Magnus Alexander of the National Industrial Conference Board will address the members. A convention of truck manufacturers represented in the chamber will be held Oct. 7, at which the problems of that branch of the industry will be discussed.

ROAD APPROPRIATION SOON

WASHINGTON, Sept. 22—No action will be taken on the highway appropriation bill until the House reconvenes on Oct. 4. The House met Wednesday but under a gentlemen's agreement will take three day recesses until October, when it will settle down to business. It is expected that differences between Senate and House bills will be smoothed out without delay because practically all highway construction dependent on Federal funds will be held up until these appropriations are available.

Wood Wheel Group Latest in M. A. M. A.

Will Dissolve Old Organization and Members Will Join Larger Association

DETROIT, Sept. 20—The Automotive Wood Wheel Manufacturers Assn. will be dissolved and its membership will be reorganized as the Wood Wheel Group of the Motor and Accessory Manufacturers Assn. following action taken at a convention of the association in Lansing. Plans for consolidating with the M. A. M. A. were made through the co-operation of M. L. Heminway, general manager of the association.

The last annual meeting of the Wood Wheel Assn. will be held in New York during the National Automobile Show week there. At this time the present association will be formally dissolved and its membership will be enrolled in the roster of the accessory association.

A report was read at the convention by Cornelius T. Myers, engineer of the Wood Wheel Assn., on developments in the methods of waterproofing wood. As a result of this report the convention passed resolutions asking Congress that appropriations for continuance of this work by the Government's forest products division be increased.

Standardization work, in which the association has been active since its organization, was brought nearer to realization by discussions at the convention, but definite action was deferred for a later meeting.

METAL MARKETS

It was to be expected that the change which has come over the sheet market would be misinterpreted in many quarters as an indication of enduring advances in steel prices generally. Such a deduction, however, appears utterly devoid of logic, when the situation is subjected to rational analysis. In fact, the steel market is sailing its course toward readjustment, according to the chart which governs all such economic changes. Every downward curve in commodity values shows here and there a bulge that temporarily halts the trend, but after a brief interval only serves to quicken it. There has been no change in basic conditions to justify a change in the course. The steel industry is still working at a rate that would have been considered unsatisfactory before the war, so that, taking conditions as a whole, the potential supply continues considerably in excess of the actual demand. Such a condition furnishes no support to the view that prices in the steel industry have turned the corner. Of the demand for some steel products, not of the price, it may be said that it has turned the corner, i.e., it has improved from a rate that was insufficient to keep mills in operation even on the lowest production schedule to one that permits of a modest scale of output, although still far from occupying anywhere near total plant capacity. The latter condition prevails in the sheet industry. It was brought about by the incentive to buying furnished by the keen competition that prevailed among rollers up to the middle of the month. When the "independents" cut under the Corporation's sheet prices the chief interest announced it would meet all price cuts and warned some of the smaller producers that they were losing money at the price levels which they were quoting. As the result of the attractive prices offered to consumers, a relatively fair tonnage of sheet orders was placed on producers' books late in August and early in September, and they feel that the momentum of buying has reached a point where they can afford to abrogate the concessions which they made so as to bring their operations up to a point where the overhead would not devour all possible profits. They figure that enough business will now come out without the necessity of coaxing it out with price concessions, to "sugar" the low-price orders they have on their books. In these circumstances it seems hardly to meet the situation to speak of a "\$5 per ton advance in the sheet market." At the present prices of sheets, so incisive an advance would indeed be spectacular.

Pig Iron.—Middle West automotive foundries are buying slightly increased tonnages of malleable. The melt of automotive foundries is reported as on the upgrade. The market has a more settled appearance.

Steel.—Cold-finished steel bars are lower as the result of hot-rolled being available at 1.65c. Cold-finished bars are obtainable at as low as 2.30c. with most mills quoting 2.40c. The strip steel market is still unsettled. Some automotive consumers are inquiring for quotations on October deliveries. The general quotation heard for the cold-rolled is 4.25c., Pittsburgh, but every order appears to be a law unto itself according to desirability, and a Cleveland report named as low as 3.50c. being quoted in one instance. The stiffer market for ordinary sheets does not seem to have affected 22 gauge auto body stock, which is quoted at 4.45c. Relatively low prices on full-finished sheets are ascribed to the pressure resulting from the downward revision in the prices of passenger cars.

Aluminum.—Somewhat more activity is noted in ingot metal, but prices appear to have been pared to make this change possible. There have been offers of 98 to 99 per cent pure ingots at 18c., duty paid, emanating chiefly from importers who are not regular handlers of aluminum.

Copper.—The market is firmer, although there has been no increase in buying by consumers.

Tin.—Consumers appear to be covered and speculators have the field to themselves.

Lead.—The lead market is fairly steady. Battery interests, however, show only slight interest, most of the buying coming from the paint and pigment industries.

FINANCIAL NOTES

Republic Rubber Corp. receiver's statement as of June 22, last, shows net assets available for the \$6,753,200 of first preferred stock (\$100 par value) equivalent to \$62.08 a share and no equity for \$1,467,900 of second preferred stock (\$100) and 478,000 shares of no par value common stock. The statement takes into consideration only about 10 per cent of the crude rubber and fabric claims against the company aggregating over \$2,000,000. The net worth of the company is given at \$4,192,219. Aggregate acknowledged liabilities are \$2,909,000, of which \$2,237,038 are notes payable. Liquid assets include \$280,404 of cash and \$500,826 of notes and bills receivable. A merchandise inventory of \$1,391,938 brings the aggregate quick assets to \$2,174,169. Plant, property and equipment at the depreciated value are listed at \$4,498,452.

Long Manufacturing Co.'s issue of \$300,000 in 8 per cent first mortgage serial gold bonds is now being offered for public sale in Detroit. The bonds are callable at 105 on 60 days' notice after Jan. 1, 1922. Company's plants and equipment are shown as appraised at \$695,717.45 and its quick assets as \$694,681.27. The proceeds of the bond sale are to be used for retirement of current bank loans. Annual business is shown to have averaged over \$2,880,000 for the past six years. Unfilled orders on hand July 30, 1921, are declared to total \$1,500,000.

Rubay Co., Cleveland, maker of automobile bodies, has declared the regular quarterly dividend of 1½ per cent on preferred stock, payable Oct. 1 to stockholders of record Sept. 20. The company has current assets of \$685,000, as against current liabilities of \$134,010, and has sufficient orders on hand to keep the plant operating on a profitable basis until next March or April.

Fisk Rubber Co. will increase its capital stock from \$5,000,000 to \$25,000,000 in first preferred and from \$7,000,000 to \$10,000,000 in second preferred, and from \$20,000,000 of stock of \$25 par value to 1,250,000 shares of common no par.

Sedan Body Co. of Union City, Ind., has increased its capital stock from \$125,000 to \$250,000.

Autocar Co., Ardmore, Pa., has issued \$1,500,000 in 6 per cent serial gold notes.

M. A. M. A. ELECTS CLARK

NEW YORK, Sept. 20—Ezra W. Clark, advertising manager of the Clark Equipment Co., Buchanan, Mich., has been elected chairman of the executive committee of the advertising managers' council of the Motor & Accessory Manufacturers Assn. He succeeds E. C. Tibbetts, formerly advertising manager of the B. F. Goodrich Rubber Co.

\$10,000,000 Chinese
Truck Order Made

Shanghai Motors Buys 3300
Vehicles from Multnomah Com-
pany—New Field Seen

SAN FRANCISCO, CAL., Sept. 21—The Shanghai Motors Co. of Shanghai, China, has placed an order with the Multnomah Motor Co. of Vancouver, B. Co., for 3300 especially-designed motor trucks. The order is subsidized heavily by the Chinese Government, according to reports of the deal received by truck distributors in San Francisco, and the purchase is the largest made in one order from the Orient since motor vehicles were introduced there.

The order calls for an expenditure of \$10,000,000 by the purchasers. It is understood that the trucks are to be used in Government-aided transportation systems operating out of Shanghai and Hongkong, China. It indicates that road building is proceeding rather more rapidly in China than has been reported hitherto, and that the Government is taking a considerable interest in the problems of transportation and distribution.

More important than this, it shows a rapidly opening field for the sale of American automotive vehicles in the Orient. The Multnomah Motors Co. sent a motor truck expert to China, while this order was being negotiated, to survey the field for which the trucks are wanted, and as a result has built a narrow-gauge, 1½-ton truck, capable of traveling, with rugged endurance, the narrow trails beyond the completed roads in that country. The narrowness of construction is said not to interfere with ease of handling on narrow turns, or with freight carrying capacity.

The company's plant at Vancouver is being enlarged to accommodate rush construction of the trucks, shipment of which to China is to begin Dec. 1, and proceed at the rate of 150 a month, for 22 months. Robert E. Cavette is president and founder of the Multnomah company, and the man largely responsible for the big sale of trucks in China is M. J. Briggs, general sales manager.

Durant of Canada Will
Be Incorporated Soon

NEW YORK, Sept. 20—Durant Motors of Canada, Ltd., will be incorporated in the near future with a capital of \$2,000,000. Until the formal organization is completed W. C. Durant will serve as president. The active head of the corporation will be one of the leading men of Canada in the automotive field but his identity has not yet been disclosed. Temporary executive offices have been opened in the Royal Bank Building in Toronto. Further details of the organization and personnel are expected to be announced in the near future.

MEN OF THE INDUSTRY

E. C. Morse has been appointed sales manager of C. H. Wills & Co., Marysville, Mich., manufacturers of the Wills Sainte Claire motor cars. Prior to his entry into the motor car business Morse was for a period of seven years a director and manager of the foreign department of the National Cash Register Co. of Dayton, Ohio, beginning his career in the motor car business as commercial manager of the E. R. Thomas Co. of Buffalo, N. Y., at that time marketing both the product of the E. R. Thomas Detroit Co. and the product of the Buffalo plant. Morse later, and upon organization of the Hudson Motor Car Co. of Detroit, was made sales manager of that company. Subsequently Morse was made vice-president and general manager of the Chalmers Motor Co. of Detroit. In 1917 Morse became associated with the Willys-Overland Co. as its Washington representative. At the end of the war Morse was made vice-president and general manager of the John N. Willys Export Corp. in New York.

Percy Frost Smith has resigned as joint managing director of Tilling-Stevens Motors, Ltd., a widely known British concern. For the past seventeen years he has been associated with Tilling-Stevens' interests, first with Thos. Tilling, Ltd., of London, and since 1915 to Aug., 1921, with Tilling-Stevens Motors, Ltd. Jointly with W. A. Stevens, Smith evolved the noted Tilling-Stevens gas-electric drive for motor-buses and motor-trucks, and since the resignation of Stevens, in 1915 from Tilling-Stevens, Ltd., he has been solely responsible for the further developments and evolution of this type. Smith is prepared to enter into negotiation with any American interests desirous of manufacturing or using gas-electric vehicles.

H. E. Rice has resigned as commercial manager of the Atwater Kent Mfg. Co., Philadelphia. He will immediately become associated with the American Bosch Magneto Corp. as assistant to Arthur T. Murray, president of the corporation. Rice has been associated with Kent in the Atwater Kent organization for nearly twelve years and has been in active charge of both contract and replacement sales, service, promotional work, advertising and sales engineering.

Charles B. Tamm of Milwaukee, for several years chief purchasing agent of the LeRoi Co., manufacturer of passenger and commercial car and tractor engines, has resigned to accept the position of assistant general manager of the Hydro-Hoist Co., which is affiliated with The Heil Co., Milwaukee, manufacturing motor truck dump bodies, truck tanks, etc. Mr. Tamm was associated with the Heil company prior to joining the LeRoi company.

L. K. Rittenhouse has succeeded **L. I. Ris** as eastern district manager of The Star Rubber Co., Inc., New York. Rittenhouse has had fourteen years of experience in the tire industry as salesman, branch and district manager with the Diamond, Goodrich and Firestone companies.

Peter Entringer, for three years secretary of the Johnson Motor Co., Fond du Lac, Wis., has resigned to form new connections. He is a pioneer dealer of Wisconsin, having been for twelve years in business at St. Cloud, Wis., before joining the Johnson company.

H. L. Corey, advertising manager, Champion Spark Plug Co., Toledo, will enter the advertising business in Utica, N. Y., Oct. 1, going with E. B. M. Wortman. The name of the agency will be Wortman & Corey.

Fred Wilson, well known in the selling end of the automobile industry, has been named general sales manager of the Stutz Motor Car Co. of America, Indianapolis, and has assumed his new duties.

Earl F. Berry, formerly of the sales staff of the Reeke-Nash Co., Milwaukee, has acquired an interest in the Milwaukee Oldsmobile Sales Co. and becomes secretary and treasurer.

J. W. Stannard has resigned as president of the Industrial Cost Assn. **Horace S. Peck**, comptroller S. K. F. Industries, Inc., New York, has been elected to fill the vacancy.

Kansas City Looks
for Big Truck Year

KANSAS CITY, Sept. 20—With more than \$100,000,000 to be spent in Kansas for good roads and with Missouri standing ready to spend \$60,000,000 for the same purpose, prospects for a big truck year with Kansas City dealers are very bright, according to C. D. Cook, local dealer in Master trucks.

The two States will furnish plenty of truck buyers, Cook says, and already the orders are beginning to come in as the contractors prepare for the building of these highways.

Cook says the truck business in Kansas City and the district is better in general than the automobile business proper.

The road building programs in the two States make necessary the use of numberless trucks and while the contracts have not as yet been awarded, contractors who know their "eggs" are now placing orders so that they will be prepared to take up the work the minute the contracts are signed.

Contractors from all parts of Missouri and Kansas are taking time to study trucks, Cook declares. They call along motor row and collect data and specifications and many are already buying.

SIAM GETTING BUSY

LONDON, Sept. 5 (By Mail)—The recent strike of oil in the north of Siam has made that country realize that motor transport has advantages over elephants and rafts. The result is that a highway capable of bearing teak-drawing tractors and rice-laden trucks is projected. This road will be 600 miles long and will run north to the boundary from Bangkok. Already 125 miles of this road is ready for traffic. Go-ahead exporters might be well advised to establish agencies at Bangkok.

LARGEST MECHANICS' LIEN

DAVENPORT, IOWA, Sept. 21—The largest mechanics' lien ever filed in Scott County was filed by Blunk & Joenke, contractors, for \$26,666.33 against the Sears Tire Equipment Co., formerly the Altenburg Tire & Equipment Co. R. B. Altenburg, former president and general manager of the company, and H. M. Rose, former vice-president and sales manager, have filed suits against the company to collect salaries alleged to be due. Altenburg's claim is for \$1,250 and Rose's for \$276.

INDUSTRIAL NOTES

Mason Tire & Rubber Co., Akron, announces that capacity of the tire department will be doubled by the first of the coming year. Contracts for the installation of new machinery to provide for the increased production have been let. After the new machinery is installed the company will have capacity for 4000 tires and 4000 tubes a day.

B. F. Goodrich Rubber Co. is maintaining its volume of sales. In August and, in fact, in the whole period since last May, it has sold at least as large a volume of merchandise—measured in units—as in any similar period in history. By liquidation of inventories the company has substantially reduced its bank loans from the \$15,000,000 at which they stood a month ago and \$29,000,000 on Dec. 31, last.

Gramm-Bernstein Motor Truck Co., Lima, Ohio, has shipped the first ten trucks of the large order received from its English representative. The factory force is being increased gradually, although the demands for the Speed Truck and the heavier models have not as yet increased sufficiently to require the addition of the full working force.

American Motors Corp., Plainfield, N. J., which is now in receivers' hands, was declared amply solvent by the United States Court, which authorized the continuance of the business with Proctor W. Hansl, formerly vice-president and treasurer, and James Kerney of Trenton acting as receivers.

H. H. Franklin Mfg. Co. reductions in prices have been followed by a marked increase in sales. Shipments for eight working days following the announcement of the cuts exceeded by 94 per cent shipments for the same period preceding the decrease.

Oshkosh Tractor Co. has started excavation work at Oshkosh for the new works of the company, which was organized some time ago with \$1,200,000 capital to take over the entire business of the La Crosse Tractor Co., and will transfer it to Oshkosh.

Fisher Body Ohio Co. has begun production of parts for stock. By Nov. 1 the plant will be turning out a complete line of closed bodies for shipment. Open bodies later will be turned out. Before Jan. 1 more than 1000 men will be at work.

Stowell Co., South Milwaukee, Wis., maker of malleable castings, has acquired the entire business of the Pelton Steel Co., Milwaukee. The Stowell company will continue under the Pelton name.

McClure Mfg. Co.'s plant in North Marion, Ind., has been leased by the Guttman-Rawley Furniture Mfg. Co. of Shirley, Ind. The company will make automobile tops in addition to furniture.

Fisk Rubber Co.'s August production ran up to 230,000 tires, or 5000 in excess of maximum estimates at the opening of the month. This is the high water mark for the year.

Gem Gasoline Lock Co. is a new Columbus, Ohio, concern which manufactures a patented lock for the gasoline line for motor vehicles. Oscar Redmond is manager.

Quaker City Rubber Co., Philadelphia, will move into a new home Nov. 1. It has been located in its present place for a quarter of a century.

Gardner Motor Co. shipments for the first six months of this year amounted to 2084 cars and the sales in July totaled 700 cars.

Timken Roller Bearing Co., Columbus, Ohio, has announced a 10 per cent reduction for hourly and piece work employees.

Calendar

SHOWS

- Sept. 28-Oct. 8—New York, Electrical Exposition, 71st Regt. Armory, Electric Equipment, Machinery and Vehicles.
- Nov. 14-19—Jersey City, Second Annual Automobile Show of Hudson County Automobile Trade Association, Fourth Regiment Armory.
- Nov. 27-Dec. 3—New York, Automobile Salon, Hotel Commodore.
- January—Chicago, Automobile Salon, Hotel Drake.
- Jan. 7-13—New York, National Automobile Show, Madison Square Garden, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 28-Feb. 2—Chicago, National Automobile Show, Coliseum, Auspices of N.A.C.C.
- Jan. 30-Feb. 4—Seventh National Tractor Show and Educational Exposition, Minnesota State Fair Grounds, Minneapolis.

- Feb. 6 to 11—Winnipeg, Can., Automotive Equipment Show, Western Canadian Automotive Association.
- Feb. 20 to 25—Louisville, Ky., Louisville Automobile Show, Auspices Louisville Automobile Dealers Association.

FOREIGN SHOWS

- September—Buenos Aires, Argentina, Passenger Cars and Equipment, La Pabellon de las Rosas, Automovil Club Argentino.
- September—Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery, Palermo Park, Sociedad Rural Argentina.
- September—Luxemburg, Luxemburg, Agricultural Sample Exhibition.
- Sept. 23-Oct. 2—Berlin, German National Automobile Show, Auspices of German Automobile Mfg. Ass'n and German Automobile Club.

- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

- Oct. 10-22—Olympia, England, Truck Show, Nov. 4-12—Car Show, Nov. 28-Dec. 3—Motorcycle Show.

- Nov. 4-12—London, British Motor Show, Society Motor Mfrs. and Traders.

- November 7-14—Paris, Seventh International Exposition of Aerial Locomotion in the Grand Palais of the Champs Elysees, Held by the Chambre Syndicale des Industries Aeronautiques.

- March, 1922—Santiago, Chili, Annual Automobile Show.

- May, 1922—Quito, Ecuador, Agricultural Exposition, celebrating Centenary of Ecuador, Automotive Section.

- Sept. 1922—Rio de Janeiro, Brazil, Automobile exhib-

its in connection with the Brazilian Centenary Association Automobillista Brasileira.

CONVENTIONS

- Oct. 12-14—Chicago, Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.
- Nov. 15-16—New York, Convention of Factory Service Managers, National Automobile Chamber of Commerce.
- Dec. 27-29—Chicago, American Society of Agricultural Engineers, Auditorium Hotel.
- Jan. 17-20, 1922—Chicago, American Road Builders Association.

S. A. E. MEETINGS

- Detroit, Sept. 23, Oct. 21, Nov. 18, Dec. 23, Feb. 24, March 24, April 28, May 26.
- Dayton, Oct. 1—First Fall Meeting.
- New York, Jan. 10-13, 1922—Annual Meeting.

VanZandt Was Freed from Revere Liability

INDIANAPOLIS, IND., Sept. 21—A document purporting to release Newton VanZandt, ex-president of the Revere Motor Car Corp., from any liability in connection with the affairs of the company, has come to light in preparation of the evidence to be submitted to the Cass County Grand Jury, now in session, and which will investigate the affairs of the Revere corporation, which is in the hands of a receiver.

The record of meetings of the Revere corporation directors is in the hands of prosecutor and will be taken before the grand jury. An examination of this record shows a copy of the document entered under date of Jan. 20, 1921. Van Zandt holds the original copy of the document.

The record of minutes also shows the directors passed a resolution at the same meeting absolving from liability C. H. Wilson, one of the directors and officers of the company. Attorneys interested in the case declined to say what effect the document probably would have.

Following is a copy of the document:

"For valuable consideration delivered to the undersigned, Revere Motor Car Corp., by Newton VanZandt, receipt of which by Revere Motor Car Corp., is hereby acknowledged, the undersigned corporation hereby releases the said Newton VanZandt from any and every claim of any and every nature whatsoever which the undersigned may or might have against said VanZandt arising out of any transaction of any nature whatsoever from the beginning of the world to the day and date of these presents.

"This release to be binding upon the successors and assigns of the undersigned corporation and to inure to the benefit of the heirs, executors, administrators and assigns of the said Newton VanZandt.

"In witness whereof the undersigned corporation has by direction of its board of directors set its hand and the official seal to these presents this 20th day of January, 1921.

"REVERE MOTOR CORP.,

"By Allen Seagraves, vice-president.

"Attest: E. R. Mattingly, secretary

"Corporate seal."

VanZandt also contends that the stock issued to him was entirely separate from that alleged to come under the "blue sky" law.

Seiberling Reported Still After Republic

CLEVELAND, Sept. 21—It is understood here that F. A. Seiberling, former president of the Goodyear Tire & Rubber Co., has resumed his negotiations for the purchase of the plant of the Republic Rubber Co. of Youngstown, which is now in the hands of a receiver. Some time ago, it was stated, Seiberling made an offer of \$2,500,000 for the factory. This proposal is said to have been satisfactory to the stockholders, but the creditors did not think the sum adequate. Since that time a new creditors' committee has been named.

Seiberling recently visited the plant of the Portage Tire & Rubber Co. at Barberton, which is in bankruptcy. This would seem to lend additional weight to the report that he proposes to establish a chain of rubber plants through the Middle West.

WILLS DEALERS MEET

DETROIT, Sept. 22—Reports at the first meeting of distributors for C. H. Wills & Co. held at Marysville, indicated that business would show steady gains. E. C. Morse, the new sales manager of the company, was introduced to the distributors and outlined the policies which would govern him in his handling of the business.

Ford Nitrate Matter Again Before Weeks

WASHINGTON, Sept. 20—Negotiations for the purchase of the Muscle Shoals establishment by Henry Ford are still pending. W. B. Mayo, chief engineer of the Ford organization, conferred to-day with Secretary of War Weeks and his advisors but he was not authorized to submit a new proposition in behalf of the Detroit automobile manufacturer.

Mayo discussed the possibilities of developing the power plant in Alabama. There have been many protests to the War Department from farmers and others, but it is known that Secretary Weeks is disposed to take the Ford offer as the best proposition. The Government cannot afford to operate the plant either independently or by a subsidy. It is reported that the offer submitted by a southern promoter had been considered, but a question had developed whether or not sufficient capital could be raised to make the necessary payment.

A report will be submitted to Ford at an early date, together with Mayo's recommendation. It is believed that Ford himself will conduct the final negotiations with the War Department.

Secretary Weeks stated that one point of difference between Ford and War Department engineers relates to the cost of finishing the Wilson and No. 3 dams. Ford proposed repaying \$28,000,000, which he assumed would be the cost of completing the Wilson dam. Secretary Weeks estimates that the work would cost twice that amount and is seeking further information which is to be supplied by engineers who now are making an investigation. Another point of difference relates to the demand of the guarantee by the Government of a certain horse-power. However, this point is not to be an important obstacle in view of reports that Ford claims there never was any such demand made.